AN ABSTRACT OF THE ANATOMY OF THE HUMAN BODY:

CONTAINING

A ſhort, but exact and ſatisfactory Deſcription of all the Parts which compoſe it, together with a plain Account of their ſeveral Uſes. By Mr. *Verdier*, ſworn Surgeon at *Paris*.

Tranſlated from the original FRENCH

By DALE INGRAM,

SURGEON and MAN-MIDWIFE.

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with a plain Account of their Several Ufes.
By the Anatomical Society at Paris.

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DEDICATION.

TO

Dr. Meyer Schomberg.

SIR,

I Beg Leave to addreſs this Tranſlation of Mr. *Verdier*'s Abridgment of Anatomy to You. The Original received the Approbation of that eminent Profeſſor of this Science Mr. *Petit*, who conſider'd it as the beſt Abſtract, and the moſt uſeful Work of the kind which has hitherto appear'd; and I could not think of any Gentleman in the Profeſſion better entitled to patronize a Performance ſo ſtrongly recommended by ſo great a Man, than yourſelf. I am too ſenſible of the common run of Dedications, which are generally made up of Flatteries unbecoming the Authors to offer and the Patrons to accept; but if I ſay that your quick Diſcernment in diſtinguiſhing, and ready Judgment in

curing Diſeaſes, have been the ſole Occaſion of your riſing to the Head of your Profeſſion, and the continuing there ſo many Years, I ſay no more than what all the World knows. What the Faculty of Phyſic, every well Wiſher to the Profeſſion, and the Public hope with me, is, that you may long live to employ your Days as you have hitherto done, to the Honour and Emolument of the one, and the Safety and Advantage of the other. Theſe, Sir, are the ſincere Wiſhes of many, but of none more ardently than,

SIR,

Your moſt Obedient

Humble Servant,

Fenchurch-Street,
April 8, 1753.

Dale Ingram.

THE Author's PREFACE.

THE Advantages which Surgery reaps from Anatomy, are at preſent ſo univerſally confeſſed, that there is hardly any one, who ſets out in the Practice of the former without a previous Knowledge of the latter. In a Word, as Surgery has for its Object the Re-eſtabliſhment of the ſolid Parts of the Human Body in their natural State, how can it be ſucceſsful in re-eſtabliſhing them without a perfect Knowledge of that State? Can a Perſon, for Example, reduce a Bone put out of its Place, without knowing how it was joined with thoſe from which it happened to be ſeparated? This to be ſure is impoſſible, unleſs Chance ſhould favour the Enterpriſe. Can a Surgeon who is ignorant of Anatomy, make a pretty deep Inciſion in any Part of the Body, without running a Riſque of opening ſome conſiderable Artery, or wounding ſome Nerve, or Tendon, *&c.*? Is it not a manifeſt expoſing of the Patient to terrible

Accidents, to blood him without knowing the Parts adjacent to the Vein which we intend to open? In a Word, every Chirurgical Operation proves how neceſſary the Knowledge of Anatomy is to Surgeons. I cannot help obſerving, on this Occaſion, that the preſent flouriſhing State of Surgery is principally owing to Anatomy.

But tho' it is certain that a Knowledge of the Parts which compoſe the Human Body, is neceſſary to Surgeons, yet it muſt be granted, that among theſe Parts, there are ſome which they ought to know more particularly, as being more expoſed to Operations, ſuch are the Bones, the Muſcles, the Arteries, the Veins, the Nerves, &c. It is for this Reaſon, that in the following Abſtract of Anatomy, which is principally deſign'd for the Inſtruction of my own Pupils, I have made it my chief Buſineſs to deſcribe theſe Parts without entering into a tedious Detail of the ſeveral Viſcera and Organs of Senſation, eſpecially ſince we find ſo comprehenſive and elaborate Deſcriptions of them in the Works of theſe great Men, who, by the force of their Genius and indefatigable Application, have communicated to us ſo great a Number of thoſe beautiful Diſcoveries with which Anatomy is at preſent ſo enriched. I ſhall think

myſelf

myſelf happy if this Treatiſe does but diſpoſe young Surgeons to reap a due Advantage from the excellent Works which theſe learned Men have given us, and eſpecially from that ſome Years ago publiſhed by Mr. *Winſlow*, that juſtly celebrated Anatomiſt, who is no leſs amiable on account of his Modeſty, than valuable on account of his Learning.

This Abſtract of Anatomy is divided into two Parts. The firſt treats of the Bones, the Cartilages, the Ligaments, *&c.*

The ſecond treats of the Muſcles, the Viſcera, the Veſſels, the Nerves and the Glands.

This Edition is augmented with many Obſervations, ſome of which regard Anatomy, and others Surgery.

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ABSTRACT OF ANATOMY.

Of ANATOMY *in General.*

THO' the word *Anatomy*, according to its etymology, ſignifies no more than a diviſion or ſeparation of the various parts of any body whatever, yet cuſtom has reſtrained its meaning, and confined it to the diſſection of the ſeveral parts, either of human bodies or thoſe of brutes. *Anatomy* therefore may be defined, *That art which teaches us the ſituation, the figure, the connexions, the ſtructure*, and the natural relations of all the parts, either of the human bodies or thoſe of brutes, that we may the more readily comprehend their ſeveral uſes.

Anatomiſts divide the human body into the trunk and the branches. The trunk comprehends three cavities commonly call'd *Ventricles*, which are diſtinguiſhed into the *ſuperior*, the *middle*, and *inferior*. In the ſuperior Venter are contained the *Brain*, the *Cerebellum*, the *Medulla Oblongata*, &c. In the middle Venter or *Breaſt* are included the *Heart*, the *Lungs*, &c. and in the inferior Venter are ſituated the principal organs of digeſtion, ſeveral of thoſe ſubſervient to generation, *&c.*

As for the *branches*, otherwiſe called the *extremities* of the body, they are divided into *ſuperior* and *inferior*; the ſuperior comprehends the *Shoulder*, the

Humerus, the *Fore-arm* and the *Hand*; the inferior conſiſt of the *Thigh*, the *Leg* and the *Foot*.

The human body is compoſed of two kinds of parts, namely, ſuch as are ſolid and ſuch as are liquid. The latter conſiſt of the blood and all the other humours, and the former are ſo many canals or veſſels which are differently arrang'd and contain the humours or fluids.

The ſolid parts have received different names, ſuch as thoſe of *Fibres*, *Membranes*, *Bones*, *Cartilages*, *Ligaments*, *Muſcles*, *Glands*, &c.

The *Fibres* are to be conſidered as long and delicate parts, or as ſo many filaments, for the moſt part pretty ſtrong and ſo fine that we cannot aſcertain and determine their ſmallneſs. Their uſe is very extenſive, ſince they enter into the compoſition of all the ſolid parts of the body.

The *Fibres* receive different names, not only from the different natures of the parts which they compoſe, but alſo from their various directions in theſe parts. Thus they are call'd fleſhy, membranous, tendinous, ligamentous and bony; or from their directions, longitudinal, oblique, circular, *&c.*

The *Membranes* are as it were ſo many pieces of network, formed principally by the different contexture and combination of the *Fibres*.

Their uſe is very various, ſince ſome line the principal cavities of the body, while others compoſe the Veſſels, *&c.*

The *Bones* are the moſt ſtrong and hard parts of the body, and ſerve as ſo many ſupports to the ſoft parts.

The *Cartilages* are parts whoſe ſubſtances are whitiſh, flexible, ſmooth, poſſeſſed of a certain degree of elaſticity, ſofter than the bones, and harder than the ligaments; they are placed in different parts of the body, for various uſes, ſome of which relate to the bones, and others to the ſoft parts.

The

The *Ligaments* are parts whoſe ſubſtance is whitiſh, cloſe, compact, but yet ſufficiently pliable and more flexible than that of the *Cartilages*. They are all more or leſs elaſtic, and very difficult to be broken or torn; ſince they are compoſed of a great number of ſmall tho' very ſtrong filaments, which by their different arrangements form either narrow connexions, or a ſpecies of ſlender webs or membranes, which ſerve to fix, contain, and limit the motions of certain parts. The ſeveral uſes of the ligaments, as well as of the cartilages, relate both to the bones and to the ſoft parts.

The *Muſcles* are parts principally compoſed of fleſhy fibres, capable of being ſtretched and lengthened. They are deſtin'd as the organs ſubſervient to all the motions of the body.

In moſt of the *Muſcles* we diſtinguiſh three parts, namely, one that is red and ſoft, and which we commonly call the belly or fleſhy part of the Muſcle, and two others which are whitiſh and pretty firm. Theſe laſt generally compoſe the extremities of the *Muſcle* and are call'd *Tendons*, when they reſemble a cord, and Aponeuroſes when the fibres which compoſe them diverge into membranes.

The *Glands* are certain organs deſtin'd either to ſeparate ſome particular humour from the blood, or only to perfect that which is call'd the *Lymph*.

Theſe different uſes of the parts, have laid a foundation for diſtinguiſhing two ſorts of *Glands*; the *conglomerate Glands* are thoſe which ſeparate a particular liquor; ſuch are the *Liver* which ſeparates the *Bile*, the *Kidnies* which ſeparate the *Urine*, and ſeveral others which ſhall be mentioned in their proper places. Theſe are call'd *conglobate Glands* which perfect the *Lymph*, that is to ſay, which attenuate or ſubtilize the parts or molicles which compoſe it; ſuch are the *Glands* of the groins and armpits, as alſo thoſe of the meſentery, *&c.* Theſe laſt alſo ſerve to perfect the chyle.

We commonly give the name of *Viſcera* to the parts included in the principal cavities of the body, without adhering to it thro' the whole extent of their ſurface; ſuch are the *Stomach*, the *Inteſtines*, the *Liver*, the *Spleen*, &c. in the *Abdomen*; the *Lungs* in the *Breaſt*, &c. The term *Organ* agrees in general to all parts capable of any particular functions; ſuch are the *Eyes*, the *Noſe*, the *Ears*, &c.

The *Veſſels* which I have ſaid enter into the compoſition of the parts of the human body, may be ranged under three different claſſes.

The firſt includes the ſanguiferous veſſels.

The ſecond the lymphatick veſſels.

And under the third is comprehended a ſpecies of particular veſſels, call'd, *ſecretory* and *excretory*.

The *ſanguiferous veſſels* are diſtinguiſhed into *Arteries* and *Veins*.

The *Arteries* are thoſe veſſels which receive the blood from the heart, in order to diſtribute it to all the parts of the body.

The *Veins* are thoſe veſſels which carry back to the heart, from all the parts, a portion of the blood which had been diſtributed to thoſe parts by the *Arteries*.

Theſe two kinds of *veſſels* are eaſily diſtinguiſhed in a living body, ſince the former, that is to ſay, the Arteries, have two motions, which the Veins have not, or which at leaſt are not very perceptible in them. In one of theſe motions, the Arteries are dilated, and by the other they are contracted, the firſt is call'd *Diaſtole*, and the ſecond *Syſtole*. Theſe two oppoſite motions form what we call the *Pulſe*.

The *lymphatic veſſels* are alſo diſtinguiſhed into *Arteries* and *Veins*.

The *lymphatic Arteries* are thoſe veſſels which receive the Lymph from the ſanguiferous capillary Arteries, in order to diſtribute it to the ſubſtance of all the ſolid parts.

The *lymphatic Veins* are thoſe veſſels which carry back from all the parts a portion of the lymph which had been diſtributed to them by the lymphatic Arteries, and which afterwards diſcharge their contents into the *ſanguiferous Veins*.

I now proceed to thoſe veſſels which are call'd *ſecretory* and *excretory*.

The *ſecretory Veſſels* are thoſe which principally compoſe the *conglomerate Glands*, and whoſe function conſiſts in ſeparating different humours from the blood.

The *excretory Veſſels* are thoſe which are only deſtin'd to receive the liquor ſeparated by the *ſecretory Veſſels*.

All the different veſſels I have mentioned are formed in ſuch a manner that they have a continual propenſity to contract and ſhrivel themſelves up; and in living animals we ſee their diameters diminiſhed in proportion as the liquor paſſing thro' them takes up a ſmaller ſpace.

We may alſo place the *Nerves* amongſt the rank of veſſels, for they only appear under the form of whipcords, form'd of the aſſemblage of many filaments running in a longitudinal direction, without any apparent cavity. Moſt phyſicians, however, are of opinion that the different filaments which compoſe them are hollow, or at leaſt of ſuch a texture and diſpoſition, as to afford a paſſage thro' their ſubſtance, to a ſpirituous fluid which proceeds from the *Brain*, the *Cerebellum*, and the *Medulla Oblongata*.

As for the different liquors contained in the veſſels I have mentioned, the principal of them is the *Blood*, which ought to be conſidered as that from which all the others except the chyle flow as from their ſource; theſe laſt are the *Saliva*, the *Bile*, the *pancreatic Juice*, that of the *Stomach*, that of the *Inteſtines*, &c.

Every body knows that the *Blood* is the red liquor contained in the *Arteries* and *Veins*.

The *Blood* is principally compoſed of three parts, namely, one call'd its *red* part, another call'd its *lymphatic* part, and the third which is ſtyled its *ſeroſity*.

Moſt phyſicians agree that the *Blood* has two motions, the firſt is that by which all the molecules which compoſe it are continually agitated amongſt themſelves, and in different directions. This motion is common to the *Blood* and all the other liquors, and is call'd the motion of *Liquidity*.

The ſecond motion is that by which the *Blood* is diſtributed from the heart to all the parts thro' the arteries, and returns from theſe parts to the heart by the veins. This motion, which depends principally on that of the heart, is call'd the *progreſſive Motion*, the *Motion of Truſion*, or the *circular Motion*.

Several modern phyſicians admit of a third motion in the *Blood*, which they call the motion of *Fermentation*, and aſcribe to it particularly the production of different humours, which are ſeparated by the organs call'd the *conglomerate Glands*; it is alſo on this motion that they make the heat of all the parts of the body to depend.

From what I have ſaid it is evident that the human body is compoſed of an infinite number of organs of different natures, and it is the diverſiy obſervable amongſt theſe organs, which has laid a foundation for dividing *Anatomy* into two general parts, namely *Oſteology*, and *Sarcology*.

Oſteology treats of the hard parts or bones, and *Sarcology* of the ſoft parts; this laſt has been divided into *Myology*, which treats of the Muſcles, *Splanchnology*, which treats of the Viſcera, and *Angeiology*, which treats of the Veſſels, and particularly thoſe of the ſanguiferous kinds, *Neurology*, which treats of the Nerves, and *Adenalogy*, which treats of the *Glands*.

PART I.

Of Oſteology.

THAT ſcience which treats of the bones is call'd *Oſteology*, from two Greek words which ſignify a treatiſe or deſcription of the bones.

In order to have a perfect knowledge of the bones, we ought to conſider them in general and in particular, and this examination ought to be made not only upon the dry bones of a deceas'd adult, but alſo upon thoſe of a carcaſs recently ſtript of its fleſh, in order to ſee at the ſame time the parts which are common to the bones, ſuch as the *Perioſteum*, the *Cartilages*, the *Ligaments*, the *mucilaginous Glands*, the *Synovia*, and the *medullary Juice*.

CHAP. I.

Of the diviſion of the Skeleton.

WHAT anatomiſts call a *Skeleton* is the aſſemblage of all the bones of the human body, or of thoſe of brutes, ſtript of the fleſh, and kept together either by their natural ligaments, or by artificial joinings; the difference of the ſubſtances which join the bones has laid a foundation for diſtinguiſhing two kinds of *Skeletons*, the one natural, and the other artificial.

The *Skeleton* is generally divided into the *Head*, the *Trunk*, and the *Extremities*.

The *Head* comprehends the *Cranium* and the *Face*.

The *Cranium* is a kind of *Oſſeous Box* formed of eight bones, which are the *Coronal*, the *Occipital*, the

two *Parietals*, the two *Temporals*, the *Sphenoide*, and the *Ethmoide Bones*.

The *Face* is formed of the aſſemblage of ſeveral pieces, which are included under two principal ones call'd the *Jaws*, one of which is the *ſuperior*, and the other the *inferior*. The *ſuperior* is compoſed of thirteen bones, namely, the two maxillaries, which are the largeſt and properly conſtitute the ſuperior jaw bone, the two bones of the *Noſe*, the two *Zygomatic* commonly call'd the cheek bones, the two *oſſa Ungues*, the two inferior *Laminæ* of the Noſe, the two bones of the *Palate*, and the *Vomer*, to which we muſt add ſixteen teeth, to wit, the four *Inciſores*, the two *Canini*, and the ten *Molares*.

The inferior *Jaw* conſiſts of one ſingle bone which alſo contains ſixteen teeth, namely, four *Inciſores*, two *Canini*, and ten *Molares*.

The *Trunk* may be divided into three parts, one common, call'd the *Spine*, and two proper, which are the *Thorax* or *Breaſt*, and the *Pelvis* or *Baſon*.

The *Spine* is a bony column, compoſed of twenty four vertebræ, diſtinguiſhed into *Cervical*, *Dorſal*, *Lumbar*, and the *Os Sacrum*, to the extremity of which is joined another bone call'd the *Coccyx*.

The *Thorax* or *Breaſt* is formed by twenty four ribs, twelve on each ſide, the ſeven ſuperior of which are call'd the true, and the five inferior the falſe or purious ribs; by the *Sternum* which is generally compoſed of two pieces, and by the dorſal vertebræ.

The *Baſon* or *Pelvis* is compoſed of two large bones, call'd the *Oſſa innominata* or the bones of the haunches, which are joined before, and behind are fixed to the *Os ſacrum* which compleatly forms the *Pelvis*.

The *Skeleton* has four extremities, two *ſuperior* and two *inferior*: Each ſuperior extremity is divided into the ſhoulder, the *Os humeri*, the fore arm and the hand.

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The *Shoulder* is compoſed of two pieces, one anterior call'd the clavicle, and another poſterior call'd the omoplata, the arm properly ſo call'd conſiſts only of one bone, call'd the *Humerus*. The fore arm comprehends two, call'd the *Radius* and the *Ulna*.

The *Hand* is diſtinguiſh'd into three parts, to wit, the *Carpus* or wriſt, which is compoſed of eight bones, the *Metacarpus*, which conſiſts of four, and the *Fingers*, which are five in number, and each of which is form'd of three pieces call'd *Phalanges*.

Each inferior extremity is divided into the *Thigh*, *Leg*, and *Foot*. The *Thigh* conſiſts only of one bone call'd the *Femur*. The *Leg* is compoſed of two large bones call'd the *Tibia* and the *Fibula*, and a ſmall one call'd the *Rotula*.

The *Foot*, as well as the hand, is divided into three parts, to wit, the *Tarſus*, the *Metatarſus*, and the *Toes*. The *Tarſus* is compos'd of ſeven bones, namely, the *Aſtragalus*, the *Calcaneum* or bone of the heel, the *Os naviculare* or *Scaphoides*, the *Cuboides*, and the three *Oſſa cuneiformia*.

The *Metatarſus* is compos'd of five pieces, and the toes are five in number, the largeſt of which is compoſed of two bones, and each of the reſt of three, which are call'd the *Phalanges*.

There are alſo ſeveral little bones which are not generally preſerved in the *Skeleton*, ſuch as the ſmall bones of the ear, the *Os Hyoides* and the *Seſamoide Bones*.

We may eaſily compute the number of all the bones which generally compoſe the *Skeleton* of an adult according to the enumeration I have made; namely, fifty four in the head, fifty four in the trunk, taking the *Coccyx* for one piece and the *Sternum* for two, and one hundred and twenty four in the extremities, which in all make two hundred and thirty two, to which if we add the eight bones of the ear and the three principal pieces of the *Os hyoides*, we ſhall find

that

that the total amounts to two hundred and forty three, without including the *ſeſamoide Bones*.

CHAP. II.

Of the bones in general.

WE ought in general to conſider four things in the bones, firſt their external conformation, ſecondly their internal ſtructure, thirdly their various connexions, and fourthly their uſes.

ARTICLE I.

Of the external conformation of the Bones.

BY the external conformation of the bones, we underſtand every thing that is ſeen on their ſurface without breaking them, ſuch as their bulk, their figure, their parts and their colour.

The bulk of the bones comprehends their three dimenſions, that is to ſay their length, breadth, and thickneſs; theſe three dimenſions of the bones vary as well as their figure; ſince ſome of them are long, others ſhort, others broad, others narrow, others thick, others ſlender, ſome ſquare, and others triangular, *&c.*

As for the parts of the bones, they are diſtinguiſhed into principal and others leſs principal. The principal part, commonly call'd the body of the bone, is that which particularly conſtitutes its ſize and bulk; and we may add, that moſt frequently the middle part of the bone is the hardeſt, and that which oſſifies firſt, as is particularly obſervable in long bones, *&c.*

The leſs principal parts of the bones comprehend their eminences, their inequalities, their cavities, and their regions. As for the eminences obſervable in the bones, they ought to be diſtinguiſh'd into two kinds,

ſome of which are continuations of the body of the bone and make but one piece with it; theſe are call'd *Apophyſes*, and the others are as it were added to and united with the body of the bone, and theſe are call'd *Epiphyſes*. The union of the *Epiphyſes* to the body of the bone is produced by means of a *Cartilage* which generally oſſifies afterwards, that is to ſay about the age of twenty, in ſuch a manner that it is no longer poſſible to ſeparate the *Epiphyſes* from it; and if we ſaw the bone and *Epiphyſes* at the ſame time we can hardly diſcover the ſmalleſt marks of the *Cartilage* that form'd their union.

The *Apophyſes* and *Epiphyſes* aſſume different names according to their figure, uſe and ſituation. With reſpect to their figure they are call'd *Heads*, *Necks*, *Condyles*, *Tuberoſities*, &c.

The *Head* is a round eminence which generally terminates ſome bone; ſuch is that obſervable at the top of the *Femur*, and *Humerus*, &c.

The *Neck* is an eminence narrower in the middle than at the extremities, as we obſerve in the *Femur*, &c. This *Neck* is ſituated immediately below the *Head*.

The *Condyle* is an eminence not exactly round but a little flat; ſuch are the poſterior eminences of the inferior *Jaw Bone*, &c.

A *Tuberoſity* is an eminence of a conſiderable extent, but whoſe ſurface is unequal and rough; ſuch is that of the *Calcaneum*, &c.

To theſe eminences we alſo give other names which are drawn from their figure, ſuch as that of the *Styloide*, the *Maſtoide*, the *Coracoide*, &c.

None of theſe eminences derive their names from their uſe, except thoſe at the ſuperior part of the *Femur*, which are call'd *Trochanters*, from a Greek verb which ſignifies to turn.

As for the eminences which take their names from their ſituation, they are principally theſe of the *Vertebræ*, which are call'd tranſverſe, oblique, *&c.*

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The *Apophyſes* and *Epiphyſes* have uſes common to them both, which principally regard the articulations of the bones, which they render more firm and ſteady, by giving a greater extent to their extremities. We may add, that the ſituation and particular figure of the *Apophyſes* and *Epiphyſes* render them fit for ſo many different uſes.

The inequalities obſervable on the ſurface of bones ſerve principally to ſecure and fix the muſcles.

The cavities found on the external ſurface of bones are of two kinds, ſome of which are deſtin'd for the articulations, whilſt others are of no uſe for that purpoſe. The firſt are either large or ſmall. The large are call'd *Cotyloid*, ſuch as the cavities of the *Oſſa innominata*. The ſmall are call'd *Glenoide*, ſuch as the cavities of the *Omoplata*, &c.

The cavities which are not ſubſervient to the articulations, have received different names; ſince they are call'd *Foſſæ* or *Ditches*, *Sinuſes*, *Sinuoſities*, *Sciſſures*, *Grooves*, *Holes*, *Canals*, and *Fiſſures*.

The *Foſſa* or *Ditch* is a cavity whoſe entrance is generally larger than its bottom; ſuch are thoſe of the *coronal* bone, *&c.*

A *Sinus* on the contra is larger at its bottom than at its entrance, as is obſervable in the *frontal* and *maxillary Sinuſes*, &c.

A *Sinuoſity* is a cavity in form of a ſpout, which is more extenſive in its length than in its breadth; ſuch is that obſervable in the ſuperior part of the *Humerus*, &c.

A *Sciſſure* differs from a *Sinuoſity* in this, that it is narrower and only lodges veſſels; ſuch is that of the *Ribs*, &c. Whereas a *Sinuoſity*, for the moſt part, only lodges *Tendons*, and is totally cover'd with a ſmooth and even *Cartilage*.

A *Groove* is a cavity in form of a creſcent, and is generally found in thoſe parts thro' which holes paſs, ſuch are thoſe of the *Vertebræ*, &c.

A *Hole*

A *Hole* is a cavity whoſe entrance is very near its other extremity, ſuch are thoſe in the baſis of the *Cranium*. A *Canal* is a cavity whoſe extremity is at ſome diſtance from its entrance; ſuch are the *maxillary* canals, *&c.*

A *Fiſſure* is a longitudinal and narrow cavity having its entrance near its other extremity; ſuch are the ſphenoide *Fiſſures*, &c.

Theſe different cavities are for the moſt part formed in the ſame bone, tho' ſome of them are produced by the meeting or concurrence of ſeveral bones, which has laid a foundation for diſtinguiſhing them into *common* and *proper*. The *proper* are thoſe found in the ſame bone; ſuch are the *Foſſæ*, obſervable in the internal ſurface of the *Cranium*, which are for that reaſon call'd *Coronal*, &c. The others call'd *common* are the *Foſſæ Orbitariæ*, the *Foramina Lacerata*, &c. Beſides all theſe different cavities, we alſo obſerve on the ſurface of the bones, ſeveral furrows which terminate in ſo many holes of indefinite ſmallneſs; we there alſo obſerve the orifices of ſeveral canals which penetrate into the internal ſubſtance of the bones.

The regions of the bones are diſtinguiſh'd with reſpect to their extent, their ſituation, and other circumſtances: The long bones are diſtinguiſh'd into the *ſuperior*, the *middle*, and the *inferior* parts; and the broad bones into their external and internal ſurfaces, *&c.* obſerving always to have regard to the natural ſituation of the body, that is, to ſuppoſe the ſkeleton in an upright poſition.

The external *conformation* of the bones alſo comprehends their *Perioſteum*, their *Ligaments*, their *Cartilages*, the *mucilaginous Glands*, and the *Synovia*.

The bones are externally cover'd with a pretty fine membrane known by the name of *Perioſteum*. It is of a very compact texture, and interſperſed with an infinite number of arteries, veins, and nerves which render it exquiſitely ſenſible.

This membrane does not cover all the bones; for we find that the *ſeſamoide* bones are not cover'd with it, nor thoſe portions of other bones which are cover'd with cartilages, or which ſerve to fix the ligaments and tendons; thoſe portions of the teeth which are out of the ſockets are alſo deſtitute of this membrane.

The principal uſe of the *Perioſteum* is to ſuſtain the veſſels, whether *ſanguiferous* or *nervous*, which are diſtributed to the bones and marrow.

A cartilage, as I have ſaid, is a part whoſe ſubſtance is whitiſh, leſs hard than the bones, more compact than any other part of the body, ſmooth, even and elaſtic, placed in different parts of the body for various uſes, ſome of which relate to the bones, and others to the ſoft parts.

The *Cartilages* which relate to the bones, are diſtinguiſh'd into two claſſes. Some of them are cloſely fix'd to the bone, and others have no immediate union with it.

The uſes of the *Cartilages* of the firſt claſs are, firſt, to cover all the extremities of thoſe bones which are join'd by a moveable articulation, and the *Sinuoſities* thro' which the tendons paſs. Secondly, to unite certain bones to each other; ſuch are thoſe which unite the *Vertebræ* by their bodies, the *Os Sacrum* to the *Oſſa Ilia*, the *Oſſa Pubis* to each other, *&c.* Thirdly, to augument the bulk of certain bones; ſuch are thoſe *Cartilages* which form the anterior part of the ribs, *&c.*

The *Cartilages* of the ſecond claſs, which are not immediately united with the bones, are for the moſt part ſituated in the moveable articulations. Theſe cartilages are principally obſerved in the articulation of the inferior jaw bones with the temporal bones, in that of the clavicles with the *Sternum*, in that of the *Femur* with the *Tibia*, &c.

All

All the *Cartilages*, except thoſe in the moveable articulations in the ſinuoſities, and other parts where there is friction, are covered with a membrane call'd the *Perichondrium*.

The *Ligaments*, as I have elſewhere ſaid, are parts whoſe ſubſtance is whitiſh, cloſe, compact, and yet ſufficiently pliant, and even more flexible than that of the cartilages. They are more or leſs elaſtic, and are not without difficulty broken or torn, ſince they are compoſed of many filaments, which, tho' ſlender, are very ſtrong, and which by their different arrangements, form either narrow connexions or ſlender webs which ſerve to fix, to contain, and prove boundaries to certain parts; their uſe, as well as that of the cartilages, relates to the bones and ſoft parts.

The *Ligaments* which relate to the bones are of two kinds, ſome are employ'd in the moveable articulations, and others either faſten the bones to each other, or adhere to them independently of their articulations.

The *Ligaments* employ'd in the moveable articulations are of two kinds; for in thoſe form'd like a groove, as in the articulation of the humerus with the cubitus, or that of the tibia with the aſtragalus, *&c.* the ligaments reſemble very narrow bands, but are very ſtrong and placed on the lateral parts of the articulation; whereas in thoſe articulations call'd *Enarthroſes* or the ball and ſocket, ſuch as that of the *Humerus* with the *Scapula*, or of the *Femur* with the *Os Innominatum*, &c. the ligament is circular, that is to ſay, it ſurrounds the articulation adhering in one part to the edges of the cavity, and in another below the head, that is to ſay, to the neck.

It is to be obſerv'd, that immediately below theſe ligaments, there is a ſlender membrane adhering all round the articulation in order to prevent the diſcharge of the *Synovia* which continually moiſtens the ſurface of the cartilages of the articulation.

Beſides

Beſides theſe, there are ligaments included and ſhut up in the articulations themſelves by a kind of capſula, ſuch as that of the *Femur*, commonly call'd the *round Ligament*, and thoſe of the *Tibia*, which are call'd *croſs Ligaments*.

As for the *Ligaments* which faſten the bones together, or thoſe which adhere to them independently of their articulations, they are of two ſorts; ſince ſome are looſe, and only bound or limit the motion of the bones; ſuch are thoſe which join the clavicles to the coracoide *Apophyſis*, that which goes from one clavicle to the other, *&c.* whereas the others are ſtretch'd and tenſe, ſuch as thoſe going from the Acromion to the coracoide *Apophyſis*, &c.

Laſtly, there are ligaments which, tho' adhering to the bones and cartilages, are nevertheleſs ſubſervient to other parts, ſuch as the interoſſeus ligaments of the fore-arm and leg, thoſe which both in the hands and feet are call'd annular; thoſe which go from the *Os ſacrum* to the ſpine and the tuberoſity of the iſchium; thoſe which fill up the foramina ovalia, and an infinite number of others.

Of the mucilaginous Glands and the Synovia.

The *Cartilages*, which I have ſaid cover the eminences and cavities of the moveable articulations, are continually moiſten'd by a liquor more or leſs viſcid, call'd the *Synovia*, which is highly neceſſary to facilitate the motions of the body.

This liquor is included in the joints, where it is retained by the membranes which ſurround them; it is principally ſupplied by the glandulous ſubſtances, known by the name of the *mucilaginous Glands*. Some alſo think that it partly ouzes thro' the pores of the internal ſurface of the membranes which ſurround the joint; it is probable that this liquor is compos'd of an unctuous matter, which the motions

and

and frictions of the joints expreſs from certain pinguious maſſes, which more or leſs accompany the mucilaginous glands.

In the *Sinuoſities* there is found a ſimilar liquor which facilitates the play of the tendons which paſs thro' them, by preſerving the flexiblility of the cartilages which cover them.

ARTICLE II.

Of the internal ſtructure of the Bones.

IN order to obtain a ſufficient knowledge of the internal ſtructure of the bones, we muſt carefully examine their ſubſtance, cavities, marrow and veſſels.

The ſubſtance of the bones is a congeries of ſolid fibres, differently diſpoſed, according to the external conformation of each bone. The fibres of the oſſeous kind are in general ſo arrranged that they compoſe ſometimes conſiderable laminæ, ſometimes ſmall plates or portions of laminæ, and at other times ſlender ſhreds or filaments of different extents; thus the ſubſtance of almoſt all the bones is partly compact or ſolid, partly ſpongeous or cellular, and partly reticular or reſembling network. The laminæ compoſe the compact part by their different ſtrata or beds; the plates conſtitute the cellular parts, and the filaments the reticular, which in many places is confounded with the cellular part.

The compact part is always more or leſs next to the external ſurface of the bones; whereas the two others poſſeſs the internal part; the firſt is very conſiderable in the middle portion of large and hollow bones; the cellular part predominates in moſt of thoſe which have either no cavity at all or a very ſmall one, and in the extremities of the long bones; and the reticular part is moſt generally found in the cavities of the long bones *.

* See on this ſubject *Havers's Oſteologia* and *Gagliardi de Oſſium*.

The internal cavities of the bones may be diſtinguiſh'd into large, middle ſiz'd and ſmall.

The large cavities are principally found in the middle of thoſe long bones which are nearly of a cylindrical figure, ſuch as the *Humerus*, the *Radius*, the *Cubitus*, the *Femur*, the *Tibia*, *Fibula*, the bones of the *Metacarpus* and the *Metatarſus*, and thoſe of the fingers.

The middle ſiz'd cavities are the cellules or interſtices of the cellular ſubſtance; theſe cavities are of different bulks and figures, and have a mutual communication with each other.

As for the ſmall cavities, we may comprehend under them, thoſe holes and canals which afford a paſſage to the veſſels diſtributed either thro' the ſubſtance of the bones or to the marrow; as alſo theſe inſenſible pores which permit the moſt ſubtile part of the marrow to penetrate the ſubſtance of the bones.

Of the Marrow and the medullary Juice.

Within the bones we find a pinguious ſubſtance more or leſs firm, which we call *Marrow*, in the middle of the long bones, where this ſubſtance is found in one maſs; and it is call'd the medullary juice in the cellular portion of theſe ſame bones, and in that of all the other bones which have not the ſame figure.

The *Marrow* is a maſs compoſed of an infinite number of veſicles, or rather of very fine membranes or cells, which adhere to and communicate with each other; they are interſperſed with many ſanguiferous and nervous veſſels, and are full of a very fine and oleous matter. This maſs is in many places croſs'd and as it were interlarded with the reticular ſubſtance, which, as I have ſaid, is found in the middle of the long bones, and which ſerves as a ſupport to it.

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The *Medullary Juice* is alſo compoſed, as well as the *Marrow*, of many membranous cellules, full of an equally oleous matter; but it is, as it were, divided into ſeveral veſicular apartments, by the oſſeous partitions of the cellular ſubſtance in which it is included, and whoſe apertures permit the medullary veſicles to communicate with each other. The *Medullary Juice* differs from the marrow in colour and conſiſtence; for it is liquid and almoſt wholly of a reddiſh colour; whereas the marrow is more firm and for the moſt part only red on its ſurface.

It is to be obſerved that when we ſay the ſmalleſt impreſſions on the marrow excite painful ſenſations, this is only to be meant of its membranous portion, which is interſperſed with nerves.

The *Marrow*, and *Medullary Juice*, have uſes common to them with the fat, and others peculiar to themſelves, that is to ſay, beſides that the marrow as well as the fat, furniſhes the maſs of blood with unctuous parts to allay the acrimony of its ſalts, it alſo diſcharges very fine ſulphureous particles, which by continually pervading the ſubſtance of the bones and giving a greater flexibility to their fibres, renders them leſs ſubject to fractures.

All the parts of freſh bones have ſanguiferous veſſels, which may be reduced to three claſſes. Some of theſe go to the external parts of the bones, others inſinuate themſelves into their ſubſtance, and others penetrate into their internal cavities.

As for the natural colour of the bones, it is white with a gentle reddiſh caſt; it is alſo to be obſerved that they are more reddiſh in children than in adults, and ſtill more ſo in their cellular than in their ſolid ſubſtance.

ARTICLE III.

Of the connexion or joining of the Bones.

THE joining of the bones ſuppoſes two things, firſt, their aſſemblage, which neceſſarily depends on the relation between the aſſembled pieces. Secondly their union, which depends on the different means which nature has employ'd to keep them aſſembled. Anatomiſts have call'd the aſſemblage of the bones *Articulation*, and their union *Symphyſis*, which properly ſpeaking is no more than the ſtrengthening of their articulations.

The articulations are diſtinguiſhed into two kinds; the one permits a motion in their articulated pieces, and is call'd *Diarthroſis*; the other permits of no motion and is known by the name of *Synarthroſis*.

The *Diarthroſis* is of two kinds; the one permits a ſenſible and manifeſt motion, and the other only ſuch as is obſcure and imperceptible. The manifeſt *Diarthroſis* is performed with a free motion in various directions, as is obſervable in the joining of the *Humerus* with the *Omoplata*, in that of the *Femur* with the *Os Innominatum*, &c. Or it is only performed with a motion confined to two directions, as in the joining of the *Cubitus* with the *Humerus*, in that of the *Phalanges* of the fingers with each other, *&c.*

The firſt of theſe articulations is form'd by the reception of an eminence into a cavity, as is obſervable in the joining of the *Humerus* with the *Omoplata*, of the *Femur* with the *Os Innominatum*, &c. This ſpecies of articulation is call'd the ball and ſocket in imitation of mechanics who uſe it in certain inſtruments. It is more or leſs deep, which has given occaſion to the ancients to make two ſpecies of it, the deepeſt of which they have call'd *Enarthroſis*, and the moſt ſhallow *Arthrodia*.

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The articulation whoſe motions are confined to certain directions, bears ſome reſemblance to a turning hinge, for which reaſon the ancient Greeks have call'd it *Ginglymus*, which ſignifies the ſame thing. We may define a *Ginglymus* a kind of articulation with motion, in which two bones are joined together by one or more heads receiv'd into as many cavities; and the motion ariſing from this is confined to two directions only.

A *Ginglymus* in general is divided into two ſorts; the one perfect and the other imperfect. The perfect *Ginglymus* is that formed by ſeveral heads and ſeveral cavities, and in which the two bones receive one another mutually, as is obſervable in the joining of the *Humerus* with the *Os Cubiti*, in that of the *Rotula* with the *Femur*, in that of the *Tibia* with the *Aſtragalus*, and in theſe of the *Phalanges* of the fingers with each other.

A *Ginglymus* is ſaid to be imperfect, when the joining of the bones is only formed by two eminences received into two cavities, as is obſervable in the articulation of the *Occipital* with the firſt vertebra of the neck, and theſe of the vertebræ with each other by their oblique *Apophyſes*; in that of the *Femur* with the *Tibia*, &c. or when a joining of two bones is only formed by the reception of one eminence into one cavity, as is obſervable in the articulation of the firſt with the ſecond vertebra, by means of its *Odontoid Apophyſis*, or in that of the *Os Cubiti* with the *Radius*, as well in the ſuperior as in the inferior part of theſe two bones.

The obſcure *Diarthroſis*, or that which permits but of very imperceptible motion, is principally obſerved in the bones of the *Carpus*, and moſt of thoſe in the *Tarſus*.

The *Synarthroſis* is that ſpecies of articulation by which the bones are kept together in ſuch a manner as to remain in a firm ſituation: It is performed in

two manners, the firſt is by indentation, and the ſecond by way of pin pegs; the firſt may be divided into two kinds, one deep and the other ſhallow. The deep indentation is obſerved in broad bones and is by the ancients call'd *Suture*, which is evidently ſeen in the joining of the bones in the cranium. The ſhallow indentation is that obſerved in the bones which are joined by more extenſive ſurfaces, and whoſe external joining does not appear denticulated; this is what the ancients have call'd *Harmony*, and for an example of this kind they have mentioned the bones of the face.

The ſecond ſpecies of *Synarthroſis* is call'd *Gomphoſis*, it may be compared to a nail or a peg received into a hole; ſuch is the reception of the teeth into the cavities of the jaw bones call'd ſockets.

All the pieces which compoſe the *Skeleton* are naturally united with each other; and this union is by the ancients call'd *Symphyſis*, which is diſtinguiſhed into two kinds, one with and the other without means.

A *Symphyſis* is ſaid to be without means, when the aſſembled bones are maintain'd in that ſtate by themſelves, that is to ſay merely by their own conformation; ſuch are the *Parietals*, which mutually ſupport each other by the peculiar ſtructure of their teeth and mortiſes, that is to ſay of the eminences and cavities which conſtitute this ſuture; this alſo holds true of the other bones of the cranium, *&c.* Some refer to the *Symphyſis* without means the union of the two pieces which compoſe the inferior jaw bone in young children; but it ought to be obſerved that this union is only a conſequence of the oſſification of theſe two pieces.

The ſecond ſpecies of *Symphyſis*, known by the name of *Symphyſis* with means, is that which unites, faſtens or maintains the aſſembled bones by the aſſiſtance of cartilages, ligaments and fleſh; and this is what

what the ancients have call'd *Synchondroſis*, *Syneuroſis*, and *Syſſarcoſis*.

The *Synchondroſis*, which is the faſtening of the bones by means of cartilages, is principally obſerved in the joining of the vertebræ by their bodies, in that of the *Oſſa Pubis* with each other, *&c.*

The *Syneuroſis*, which is the faſtening of bones by ligaments, is principally found in all the moveable articulations. It alſo fortifies the *Synchondroſis* as is obſervable in the joining of the vertebræ by their bodies.

The *Syſſarcoſis*, which is formed by means of the fleſh, is as genuine as the preceding two, according to the remark of Mr. *Winſlow*. In a word, the examples which the ancients have given of the faſtening of the *Omoplata* with the ribs is very well founded; for tho' it is true that the *Omoplata* is fixed at its neck and ſomewhat farther to the clavicle and the humerus, by particular ligaments, yet it is certain that its baſe which is its oppoſite extremity, has abſolutely no other connexion than that formed by means of the muſcles; and without this ſpecies of particular connexion, the motions of this bone would not be more regular than thoſe of a diſlocated bone. It is alſo to be obſerved that the *Syſſarcoſis* ſtrengthens many of the moveable articulations †.

ARTICLE IV.

Of the uſe of the Bones.

WE may ſay that the bones in general are to the body what the timber work is to a building; they give ſtrength and proportion to the body, ſuſtain all its organs, and preſerve the animal in all the ſituations agreeable to its functions.

† See Mr. *Winſlow*'s Anatomy, treatiſe of the dry Bones, N° 158.

CHAP. III.

Of the Head.

THE firſt and at the ſame time the moſt elevated part of the *Skeleton* is the head, which comprehends the *Cranium* and the *Face*.

The *Cranium* is an oſſeous box nearly of an oval figure; it is prominent in its anterior and poſterior parts, but flat on its ſides.

The *Cranium* is form'd of the aſſemblage of eight bones which are diſtinguiſh'd into common and proper; among theſe laſt are generally reckon'd the *Coronal*, the *Occipital*, the two *Parietals*, and the *Temporals*. The common are the *Sphenoide* and *Ethmoide* Bones, to which however ſome add the *Coronal* and even the *Temporals*.

All theſe bones are joint with each other; and ſome of them are even united with thoſe of the face by ſutures, which the ancients divided into true and falſe; but at preſent we acknowledge only ſuch as are true, which are diſtinguiſh'd into common and proper. Among the common we reckon the *Sphenoidal*, which joins the greateſt part of the *ſphenoide* bone to the adjacent bones; the *Ethmoidal*, which principally joins the *Ethmoide* to the *coronal* bone; the two *Zygomatics*, which join the *Temporals* to the cheek bones; and laſtly the *Coronal*, which joins the *coronal* to the *parietal* bones. The ancients admitted a fifth, which they call'd *tranſverſe*, and which extends all along the inferior part of the *coronal*.

Among the proper ſutures we reckon the *Sagittal*, which joins the *Parietals* by their ſuperior parts, the *Lambdoide*, which joins the *Occipital* to the *Parietals* and to the *Temporals*, and laſtly, the two *Temporals* or the ſquamous ſutures of the ancients which join the *Temporals* to the *Parietals*.

The

The ſutures not only ſerve to mitigate and blunt the violence of the blows to which the *Cranium* is expoſed, but alſo to hinder a fracture made in one of its pieces from communicating itſelf eaſily to thoſe adjacent to it; we may add that the *Dura Mater* by their means communicates with the *Pericranium*; that the tranſparation of the parts included in the *Cranium* may be carried on with greater eaſe; and laſtly, that the parts where the ſutures are, being membranous in the *Fœtus*, it reaps a great advantage from them, on account of the great facility with which the bones of the cranium approach each other upon the ſmalleſt preſſure.

Between the ſutures of the *Cranium*, but eſpecially in the lambdoide ſuture, we frequently find ſmall bones of different bulks and figures, which the anatomiſts call keys, and in Latin *Oſſa Wormiana.*

It is to be obſerved that in ſome ſubjects there is found, at the ſuperior part of the *Occipital*, a triangular bone of a pretty conſiderable extent, which for the moſt part is ſeparated thro' all its length by a particular ſuture. We alſo find, tho' more rarely, ſubjects in which there is alſo a triangular bone which is larger and ſituated at the fontanelle. In wounds of the head ſurgeons ought to pay a particular regard to this obſervation, that they may not take the ſutures of theſe particular bones for fractures.

All the bones of the *Cranium* are compoſed of two *Laminæ* call'd *Tables*, one of which is external, the other internal. This laſt is more ſlender and brittle than the other; between theſe two *Laminæ* there is a ſpongy ſubſtance call'd the *Diploe*, which conſiſts of many oſſeous cells which communicate with each other and contain a medullary juice.

The *Diploe* is not of the ſame thickneſs thro' all the extent of the cranium, ſince there are ſome parts where it is found in a ſmall quantity, and others where it is not to be met with at all; this ought to be carefully

carefully adverted to by ſurgeons in performing the operation of the trepan.

Of the coronal Bone.

The firſt bone of the *Cranium* is the *Coronal*; its figure is ſemicircular, and its ſituation is in the anterior part of the *Cranium*, this bone has two ſurfaces, one external, and the other internal; the external is convex in the greateſt part of its extent, and the internal is concave. In the interior part of its external ſurface we find five *Apophyſes*, four of which are call'd angular, becauſe they correſpond to the angles of the eyes; ſome call them orbitary, and diſtinguiſh them into internal and external; the fifth, call'd the *Naſal*, ſerves as a ſupport to the bones of the noſe; in this place alſo there are two depreſſions which make part of the orbits, and at the ſuperior edge of the orbits there are two holes call'd *Superciliary*, which for the moſt part are no more than grooves. The inferior and middle part of the coronal is channel'd in order to lodge the *Os Ethmoides*; and at the joining of theſe two bones, eſpecially near the orbits, we find a hole on each ſide, and ſometimes two, which are call'd the internal orbitary holes.

In the internal ſurface of the *Coronal* we are to conſider two depreſſions alſo call'd *Coronal*, a *Spine*, a *Sciſſure*, a *Hole* call'd blind or ſpinal, and ſeveral ſuperficial depreſſions which correſpond to the ſeveral circumvolutions of the brain.

In the middle and inferior part of the *Coronal* we diſcover the mouths of the frontal and ſuperciliary ſinuſes, which run thro' the whole thickneſs of that bone, and which communicate with the noſe. We ſometimes find ſubjects which have but one of theſe ſinuſes, and others in which they are both wanting.

The meeting of the *ſagittal* with the *coronal* Suture is call'd the bregma; this part is membranous in very

very young children, and is call'd the fontanelle or fountain of the head, whoſe figure nearly reſembles that of a lozenge; it is formed partly by the coronal and partly by the parietal bones.

In children the coronal is compoſed of two pieces (which ſometimes happens in adults), and in this caſe there is a particular ſuture which unites theſe two pieces and reaches from the *Sagittal* to the root of the noſe. The connexions of the coronal with the parietals are uppermoſt, and its lowermoſt connexions are with the *Os Sphenoides*, the *Ethmoides*, the proper bones of the noſe, the maxillary bones, the *Os Unguis*, and thoſe of the cheek.

Of the parietal Bones.

The *parietal* bones are nearly of a ſquare figure; their ſituation is on each ſide at the ſuperior, middle and lateral parts of the cranium.

The external ſurface of theſe bones is convex and pretty ſmooth; along their middle and inferior parts we find ſome eminences and cavities to facilitate their joining with the ſquamous or ſcaly part of the temporals. We ſometimes obſerve a hole in the ſuperior and poſterior parts of theſe bones. In the internal or concave ſurface of the parietals there are ſeveral ſciſſures which nearly reſemble the impreſſions of a fig-tree leaf. In the internal part of the anterior and inferior angle of each *Parietal*, there is a ſmall canal which correſponds with theſe ſciſſures; and in the internal part of the poſterior and inferior angle there is a kind of pipe which joins with one of theſe of the occipital.

The parietals are joined with each other at their ſuperior part, with the *Temporals*, with the *Sphenoide* at their inferior, with the *Coronal* at the anterior, and with the *Occipital* at their poſterior parts.

Of the occipital Bone.

The *occipital* bone poſſeſſes the poſterior and inferior part of the head; its figure nearly reſembles that of a lozenge.

This bone is generally the thickeſt and even the hardeſt of all thoſe in the *Cranium*, if we except the ſtoney *Apophyſis* of the temporals, which I ſhall afterwards deſcribe; its thickneſs is not the ſame in all its extent; ſince we obſerve that it is very ſlender in its lateral and inferior parts.

In the external ſurface of this bone, which is convex and rough, we obſerve two eminences call'd *Condyles*, which are received into the ſuperior cavities of the firſt *Vertebra* of the neck, by its ginglymoide articulation with that vertebra, by means of which the head may be bended and extended at pleaſure; along its middle and inferior part, we obſerve a perpendicular ſpine, and a tranſverſe *Apophyſis* which ſome call the *Nape*, tho' that name is generally given to the poſterior and ſuperior part of the neck.

In the internal or concave ſurface of the occipital we find a crucial *Spine*, three and ſometimes four ſciſſures, in form of pretty conſiderable pipes, two grooves which unite with other two belonging to the temporals, and form two holes call'd the *Foramina Lacerata*; five holes, two of which open before the *Condyles*, and two others in the poſterior parts of theſe eminences; which has laid a foundation for their being call'd Condyloide holes, and diſtinguiſhing them into anterior and poſterior. There are ſome ſubjects in which theſe laſt are not to be found. The fifth, which is odd, is the great occipital hole; four ditches, call'd occipital, two of which are ſuperior and other two inferior; we ought laſtly to obſerve its anterior apophyſis, by ſome call'd the *Sphenoidal*, and by others the *Baſiliary*, which is join'd to the body

body of the ſphenoide, by means of a cartilage. The other connexions of the occipital are by ſuture with the parietals and temporals; beſides theſe it is alſo joined to the firſt vertebra of the neck by a *Ginglymus* with two heads, and laſtly to a particular *Apophyſis* by two ſtrong ligaments.

Of the Bones of the Temples.

The *temporal* bones are ſituated in the lateral, middle and inferior part of the *Cranium*.

Their figure is pretty irregular, and they are generally divided into two parts, one ſuperior call'd *ſquamous*, and another inferior call'd *ſtony*; theſe two parts are eaſily ſeparated from each other in young ſubjects, but they are afterward ſo firmly united that it is impoſſible to divide them.

We obſerve that the external ſurface of each temporal is a little convex, pretty ſmooth in its ſquamous but very rough in its ſtony part. On the external ſurface of theſe bones we find eminences and cavities; theſe eminences are *Apophyſes* which have received various names. The firſt or anterior is call'd *Zygomatic*, and is joined to another *Apophyſis* of the cheek bone, in order to form with it an arch call'd *Zygoma*. The ſecond is call'd the tranſverſe, and ſerves as a baſe to the zygomatic. The third is call'd the *Maſtoide*, and the fourth is call'd the *Styloide*. As for the cavities, we at firſt obſerve four *Canals*, one of which correſponds to the external ear; at the end of this canal we find a very ſlender membrane adhering which is call'd the *Membrana Tympani*, commonly call'd the drum of the ear, which ſeparates the external from the internal ear. This canal is wanting in a fœtus, and in this caſe the *membrana tympani* is as it were enchaſed, or ſet in a particular circle call'd the oſſeous circle: Behind this membrane we find a cavity call'd the caſe of the drum, in which

there

there are four ſmall bones known by the names of the *Hammer*, *Anvil*, *Stirrup*, and the *Orbicular*.

In the *Hammer*, we find a head and a handle. The head has eminences and cavities for its ginglymoide articulations with the anvil; we alſo find in this bone a ſlender *Apophyſis*, commonly call'd the apophyſis of *Rau*. The *Anvil* has a body and two branches. In the *Stirrup* we find a head which is ſomewhat hollow, and a baſe; and the orbicular has two convex ſurfaces. The hammer is fixed by its handle to the *Membrana Tympani*. The *Anvil* is join'd by its body to the head of the *Hammer*. The *Orbicular* is join'd to the extremity of the long branch of the *Anvil*, and alſo to the head of the *Stirrup*: The baſe of this laſt reſts upon the edge of an aperture call'd the *Feneſtra ovalis*, there is alſo in the caſe of the drum a ſecond aperture call'd the *Feneſtra rotunda*, which is cloſed up by a very ſlender membrane; theſe two apertures communicate with each other in the ſecond part of the internal ear, call'd the labyrinth, which is compoſed of three ſemicircular canals, the *Veſtibulum* and the *Snail*: Laſtly, in the anterior part of the caſe of the drum we find the extremity of a particular canal which communicates with the mouth; this is call'd the *Euſtachian Tube*, and by ſome, tho' very improperly, the Aqueduct.

The third canal obſervable in the external ſurface of the temporal bone is call'd the *carotid* duct, becauſe the artery of that name paſſes thro' it; this duct penetrates into the cavity of the *Cranium*. The fourth canal call'd the *Aqueduct* of *Fallopius*, alſo penetrates into the *Cranium*. Its internal orifice correſponds to the internal *foramen auditorium*, which I ſhall afterwards deſcribe, and its external orifice lies between the *maſtoide* and *ſtyloide* apophyſes, for which reaſon it is call'd foramen *Stylo-Maſtoideum*.

Beſides this, we obſerve a *glenoide* cavity placed immediately behind the tranſverſe *Apophyſis*, which I

have ſaid ſerves as a baſe to the *Zygomatic*, and this cavity receives the *Condyle* of the inferior jaw bone. Here we laſtly obſerve the *Foſſa jugularis*, to the formation of which the occipital alſo contributes.

In the internal ſurface of the temporal bone, we obſerve an *Apophyſis* diſtinguiſh'd by the epithet *ſtony*, which includes the ſecond part of the internal ear, call'd the *Labyrinth*. This apophyſis has two ſurfaces, one anterior the other poſterior; on the anterior we ſee a ſmall hole which communicates with the *Aqueduct* of *Fallopius*; and upon the poſterior we alſo find a hole call'd the *Foramen auditorium internum*, which is much more conſiderable than the former. In this internal hole we find the beginning of the *Aqueduct* of *Fallopius*, as I have already obſerved. On this ſurface we alſo obſerve a groove which joins with that of the *Occipital*, to form the *Foramen laceratum*, as alſo two *Seiſſures*, one large and one ſmall; and laſtly, the *Foramen Maſtoideum*, which however is not found in all ſubjects.

The temporals form a part of the inferior *Foſſa Occipitalis*, and the greateſt portion of that call'd the temporal.

The temporal bones are join'd to the parietals, the cheek bones, the ſphenoide, and the occipital, and are alſo articulated with the inferior jaw.

Of the ſphenoide Bone.

The *Sphenoide*, otherwiſe call'd the *Baſiliary* or wedge-like bone, is of a figure nearly reſembling that of a bat with extended wings, and is ſituated in the middle of the baſis of the cranium. In this bone we diſtinguiſh a body and two branches, commonly call'd the flat *Apophyſes* of the *Sphenoide*.

We are alſo to conſider two ſurfaces in it, one external, and the other internal: The external ſurface has five *Apophyſes*, two *Holes*, two *Sinuſes*, and ſix *Grooves*.

Grooves. Of theſe five apophyſes, two are call'd *Pterigoide*, in each of which we diſtinguiſh two *Wings*, one external and the other internal. At the inferior part of the internal *Wing* we find a *bony prominence*, round which the tendon of a muſcle paſſes. The third and fourth *Apophyſes* are call'd *Spinal*, and the fifth, which is placed between the two *Pterygoides*, is call'd the *Creſt* of the *Sphenoide*. The *Holes* are call'd *Pterygoidean*; and the *Sinuſes* call'd *Sphenoidal*, open into the noſe of the *Grooves*. There are two *anterior*, two *poſterior*, and two *inferior*: The *anterior* help to form the *ſpheno-maxillary* fiſſures, and the *ſpheno-palatine* holes; the *inferior* lie betwixt the wings of the *Pterygoide* apophyſes, to receive a portion of the bones of the palate.

This bone forms a part of eight foſſæ or ditches, namely the two *Naſal*, the two *Pterygoidean*, the two *Orbitaries*, and the two *Zygomatics*.

In the internal ſurface of the *ſphenoide* bone, we are to conſider four *Apophyſes* call'd *Clinoide*, two *Fiſſures* call'd *Sphenoidal*, eight *Holes*, four on each ſide; namely, the *optic*, the *ſuperior maxillary*, the *inferior maxillary*, and the *hole* for the paſſage of the artery of the *dura mater*; a ditch call'd *pituitary*, or the *Saddle*, at the ſides of which we find two grooves. This bone forms a part of the two temporal *Foſſæ* or ditches.

The *ſphenoide* bone is join'd with all the bones of the *Cranium*, as alſo with thoſe of the *Cheeks*, the *maxillary* bones, thoſe of the *Palate*, and the *Vomer*.

Of the ethmoide Bone.

The *ethmoide* or *cribiform* bone, ſo call'd becauſe by looking at it, we perceive it perforated with a great number of holes reſembling thoſe of a ſieve, is ſituated in the anterior part of the baſis of the cranium, being as it were enchaſed in a particular groove of the coronal.

Tho' the figure of the *Ethmoide* is not regular, yet we may juſtly ſay that it more nearly reſembles that of a cube or common die, than any other, ſince it may be diſtinguiſh'd into ſix ſurfaces; one ſuperior, one inferior, one anterior, one poſterior, and two lateral.

When we examine the external ſurface of the ethmoide bone it appears compoſed of three parts, one middle and two lateral. The middle part is a bony *Lamina*, which forms the ſuperior portion of the partition of the noſe; it is join'd to the *Vomer* which conſtitutes its inferior portion. The lateral parts of the ethmoide bone may each of them be diſtinguiſh'd into two portions, tho' they are all contiguous to each other. Of theſe two portions there is one ſuperior, which is cellular and winding; and another inferior, which in ſome meaſure reſembles a ſmall horn, or the head of a muſcle-ſhell, whence it is call'd the ſuperior horn or ſhell of the noſe, to diſtinguiſh it from the inferior horns which I ſhall afterwards deſcribe: It has a convex part, which is next to the partition, and a concave which is on the oppoſite ſide.

Near the partition we find a groove or fiſſure between the two portions which compoſe each lateral part of the *Os Ethmoides*, and in this fiſſure the cellules of the ethmoide bone open themſelves in order to communicate with the noſe; for in all the reſt of the cellular portions, the cellules are for the moſt part ſhut up by the adjacent bones with which this portion is join'd: In a word, in the ſuperior part they are cloſed up by the coronal, and the frontal ſinuſſes ſtop up the cellules in the anterior part: In the poſterior and inferior parts they are obſtructed by the bones of the palate, the ſphenoide bone, and thoſe call'd the maxillary. In the external part near the orbit, theſe cellules are confin'd by the *Os Unguis*, and by a very ſmooth lamina, of which the ancients made a particular bone, which they call the *Os Planum*.

In the internal ſurface of the ethmoide bone we obſerve a *Lamina* call'd *Cribriform*; the holes found in this bone retain the name of olfactory from thoſe nerves which paſs thro' them. This *Lamina* is croſſed in all its length by an eminence call'd the *Criſta Galli*, which appears to be a continuation of the bony lamina which ſeparates the two cellular bodies I have mentioned.

The *ethmoide* bone is join'd with the *Coronal*, the *Sphenoide*, the bones of the *Noſe*, the *maxillary* bones, the *Oſſa Unguis*, the bones of the *Palate*, and the *Vomer*.

In the *Cranium* are contain'd the *Brain*, the *Cerebellum*, and the *Medulla Oblongata*; and thro' the holes I have now mention'd, thoſe nerves paſs which are diſtributed thro' the different parts of the body. There are alſo ſome of theſe apertures, which afford a paſſage to the ſanguiferous veſſels which ſupply the brain with blood, *&c.* or which receive the remainder of that liquor. The great perforation of the occipital affords a paſſage to nerves, ſanguiferous veſſels, and the medulla oblongata which goes to the canal of the vertebræ, where it aſſumes the name of ſpinal marrow.

Of the Face.

The *Face* is compos'd of two jaw bones, one ſuperior and the other inferior. The ſuperior is form'd of an aſſemblage of thirteen bones, without including the teeth. Theſe bones are, thoſe proper to the noſe, the maxillaries, the *Oſſa Unguis*, thoſe of the cheek, the inferior *Lamina* of the noſe, the bones of the palate, and the *Vomer*.

Of the bones proper to the Noſe.

The bones proper to the noſe form the ſuperior part of the naſal arch; their figure is nearly ſquare; their

their external ſurface is ſomewhat convex and pretty ſmooth, but their internal ſurface is concave and rough: The ſuperior parts of theſe bones is much thicker than the inferior, which is nitch'd unequally in order to favour the adherence of the cartilages of the noſe.

Theſe two bones, thro' the whole length of their union, form within the noſe a *longitudinal Groove*, which receives the bony *Lamina* of the ethmoide, on which theſe bones are ſupported as well as on the inferior and middle part of the coronal, and are alſo join'd to a prominent part of the maxillary bones. We generally obſerve one or two ſmall holes in the bones of the noſe.

Of the maxillary Bones.

The *maxillary* bones form the greateſt part of the jaw; their figure is pretty irregular, and their ſituation is in the middle part of the face. Theſe bones are ſomewhat depreſſed, and this depreſſion is by ſome call'd the *Foſſa Maxillaris*. Beſides this they form a part of four foſſæ, to wit, the *Orbitary*, that of the *Palate*, the *Naſal*, and the *Zygomatic*.

In each *maxillary* bone we obſerve three *Apophyſes*; the firſt is call'd the angle of the maxillary bone, and forms a part of the arch of the noſe, for which reaſon it is commonly call'd naſal: The ſecond is by ſome call'd *Malaris*; and the third the *Spine*, which being united with that of the oppoſite maxillary, forms with it a kind of creſt for fixing the cartilage, which forms a part of the naſſal partition.

In the maxillary bone we alſo obſerve a candal, call'd the ſuperior maxillary, which runs along the inferior part of the orbit, and whoſe external orifice is by ſome call'd the external orbitary hole: We here alſo find at the ſide of the ſpine, a hole which in its inferior part terminates by a groove, which, uniting

with a ſimilar one in the other maxillary bone, forms a hole in the anterior part of the palate call'd the inciſory hole: In the external ſurface of this bone there are ſmall holes which have no particular names. In the maxillary bone we are alſo to conſider three grooves, the firſt at the entrance of the *Naſal Foſſa* or ditch; the ſecond at the entrance of the *Foſſa Orbitaria*; and the third forms the greateſt part of the *Naſal duct*.

In the internal ſurface of each maxillary bone, which forms part of the *Naſal Foſſa* or ditch, we diſcover the orifice of the maxillary ſinus, which is a very conſiderable cavity made thro' the whole thickneſs of theſe bones. We alſo obſerve all along their inferior part, ſeveral ſmall depreſſions call'd ſockets, which are made in the thickneſs of the bones, and in adults their number is generally eight in each bone.

The *maxillary* bones are not only join'd to each other, but alſo to the *coronal*, the *ethmoide*, the *os unguis*, the cheek bones, the proper bones of the noſe, thoſe of the palate, the *Vomer*, and the inferior *Laminæ* of the noſe.

Of the Oſſa Ungues.

The *Oſſa Ungues*, ſo call'd on account of their figure and thinneſs, are ſituated at the entrance of the orbits next to the noſe, being join'd with the *Coronal*, the *maxillary* bone, the inferior *Lamina* of the noſe; and, laſtly, with the *ethmoide* bone and the *Os Planum*. This laſt, as I have already obſerved, near the orbit, covers part of the cellules of the ethmoide, the other part being cover'd by the *Os Unguis*.

In the *Os Unguis* we are to conſider two ſurfaces, the internal is ſomewhat convex and rough, and the external a little concave: This laſt in its anterior part has a groove, which joins with the naſal *Apophyſis* of the *maxillary* bone in order to form a particular duct call'd

call'd *Naſal*, correſponding to that of the noſe. All along the groove of the *Os Unguis* we perceive a great number of very ſmall holes.

Of the zygomatic or cheek Bones.

The bones of the cheek have each a quadrangular figure, and the four angles which terminate them may be diſtinguiſhed into two anterior, one ſuperior, and one poſterior. Theſe bones by their anterior angles are join'd to the *maxillary*, by the ſuperior to the coronal and to the ſphenoide, and by the poſterior to the temporal *Apopyhſis*; and by the union of this poſterior angle with the temporal *Apophyſis*, that arch is formed which the anatomiſts call *Zygoma*, which ſignifies *Yoke*.

In each of the cheek bones we may diſtinguiſh three ſurfaces, one external, one internal, and one ſuperior. The external forms the eminence of the cheek, the internal makes part of the zygomatic ditch, and the ſuperior conſtitutes a part of the *Foſſa Orbitaria*. In theſe bones we are alſo to conſider two grooves, one of which forms the inferior part of the *Orbit*, and the other is ſituated at the ſuperior part of the *Zygoma*. For the moſt part we obſerve in the external ſurface of theſe bones, one and ſometimes two ſmall holes which correſpond with each other in the *Orbit*.

Of the inferior Laminæ of the Noſe.

The inferior *Laminæ* of the noſe, by ſome call'd the horns, are the inferior ſhells of the noſe, and nearly of the ſame figure with that of the half of a muſcle-ſhell. Theſe bones are ſituated in the inferior part of the naſal foſſæ, in ſuch a manner, that in each of them we are to conſider two ſurfaces, one external, which is concave, and another internal, which is convex; this laſt is next to the partition of the noſe.

Theſe bones are broader at their anterior than at their poſterior extremity; their inferior edge is ſomewhat round, and the ſuperior has an *Apophyſis* and a groove; and by this edge it is that theſe bones are join'd with the *maxillary* and thoſe of the *Palate*, and even advance to the *Os Unguis*. The inferior *Laminæ* of the noſe cover on each ſide the inferior orifice of the *naſal* duct.

Of the bones of the Palate.

The bones of the *Palate*, which the ancients thought to be ſquare, are nevertheleſs of a very irregular figure. They are ſituated at the poſterior part of the arch of the palate, whence they advance to the bottom of the orbit, mounting along the *Pterygoide Apophyſes:* In each of theſe bones there are four parts to be obſerved, namely, one ſuperior call'd the *Orbitary*, two inferior, one of which is call'd that of the palate, the other the *Sterygoidean*; and the fourth is call'd the middle or naſal on account of its ſituation. In theſe bones we are alſo to conſider two grooves and one hole: Of theſe grooves one helps to form a particular duct, whoſe orifice is obſerved in the poſterior part of the palate; it is call'd the *Guſtatory hole* or the poſterior one of the palate, in order to diſtinguiſh it from the inciſory hole, by ſome call'd the anterior *palat ne* hole: The other groove helps to form the *Spheno-palatine* hole, by ſome call'd the *Sterygo-palatine*. The hole which is proper to each bone of the palate, is found at the poſterior part of theſe bones, and penetrates into that duct whoſe orifice is call'd the *Guſtatory* hole.

Theſe bones conſtitute a part of the naſal, palatine, ſterygoidean, and orbitary foſſæ; and part of the ſides of the maxillary and ſphenoidal ſinuſes.

The bones of the palate are not only joined with each other, but alſo with the *Maxillaries*, the *Vomer*, the

the *Ethmoide*, the inferior *Laminæ* of the noſe, and the ſphenoide.

Of the Vomer.

The *Vomer* is that bone which makes the inferior part of the partition of the noſe. Its figure nearly reſembles that of an oblong ſquare; it has two ſurfaces, one on the right and another on the left; two edges, one ſuperior and another inferior: The ſuperior has a groove to receive a portion of the bony *Lamina* of the *Os Ethmoides* with the cartilage which perfects the partition; it has alſo a more conſiderable cavity to receive the creſt of the *Sphenoide*. The inferior edge of the vomer is ſlender and irregularly denticulated; it is received into a groove which runs all along the maxillary bones and the bones of the palate at their union: The poſterior and inferior part of the vomer is a little ſharp; it touches no other bone, and extends from the bones of the palate to the creſt of the *Sphenoide*, near which the aſperity of the *Vomer* is loſt.

Of the inferior Jaw.

The *inferior Jaw* is compoſed of two pieces in young ſubjects without including the teeth. Theſe two pieces are by age united in ſuch a manner that it is not poſſible to ſeparate them, and in this caſe the jaw is only compoſed of one piece, whoſe figure reſembles that of a horſe's ſhoe. This bone is to be conſidered as having two ſurfaces, one external, which is convex, and another internal, which is concave: We may alſo diſtinguiſh in it a body and two branches; the body is as it were divided in its middle by a prominent line, which denotes the place of the union of the two pieces which compoſe the inferior jaw in children; and this line is call'd the *Sym-*

phyſis of the chin: All the ſuperior edge of this jaw is furniſh'd with ſeveral cavities call'd ſockets, the number of which is generally ſixteen in adults. The inferior edge call'd the baſis, has two lips diſtinguiſh'd into external and internal. The branches run backwards and terminate underneath by two angles, and above by four *Apophyſes*, of which the anterior are call'd *Coronoide*, and the poſterior *Condyloide*; theſe *Apophyſes* are ſeparated by a groove. In the internal ſurface of the poſterior part of the inferior jaw we diſcover the aperture of a duct, which runs all along this jaw and opens in the chin by a whole which derives its name from the Latin word *Mentum*, and it is therefore call'd *Mental*.

The inferior jaw is join'd with the temporal bones by an articulation which is partly the *Ginglymus* and partly the *Arthrodia*, by means of which the jaw bone cannot only raiſe and depreſs itſelf, but alſo move forwards and backwards, and in all directions. In this articulation we find three cartilages, namely, one which covers the *Condyle*, and the ſecond which covers the *glenoide* cavity; this laſt runs over the tranſverſe *Apophyſis* which forms the anterior edge of this cavity: The third, which is placed between theſe two, is of the ſame extent with the ſecond, and is fixed in all its circumference to the orbicular ligaments of this articulation. It is alſo to be obſerved that the condyles do not remain always lodg'd in the glenoide cavities during all the motions of the jaw bone; for ſometimes they advance to the tranſverſe *Apophyſes*, which was the reaſon for Mr. *Winſlow*'s giving them the name of the articular Apopyſis.

Of the Teeth.

The *Teeth* are the whiteſt and at the ſame time the hardeſt bones of the *Skeleton*; they are commonly diſtinguiſh'd into *inciſory*, *canine*, and *molary*. The *inciſory*

ciſory are the moſt anterior; the *molary* are the moſt poſterior; and the *canine* are placed between the two. There are four *inciſory* teeth in each jaw, two *canine* and ten *molary*; which makes thirty two teeth, and conſtitute the moſt ordinary number in adults. The *canine* in the upper jaw are call'd the *Eye Teeth.*

In each tooth we diſtinguiſh two parts, namely, one which is apparent and which is call'd the body or crown of the tooth; another which is concealed in the ſocket and is call'd its root, whoſe length is more conſiderable than that of the body: Theſe two portions are diſtinguiſh'd by a circular line which we call the neck of the tooth.

The difference obſervable in the external conformation of the body of the *inciſory*, *canine*, and *molary* teeth renders them proper for different uſes. We obſerve that the body of the inciſory is cutting at the extremity oppoſite to the root, a little convex before, and concave behind: This diſpoſition renders theſe teeth proper for cutting the aliments. The *canine* teeth have their bodies more round, thick and ſolid than thoſe of the *inciſory*; and their extremities oppoſite to their roots are cut into blunt points: This diſpoſition renders them not only very proper to pierce the aliments, but alſo to hold them firm when we make an attempt to break or tear them: They alſo ſerve to gnaw theſe aliments which ought to be ſo; for this reaſon we naturally put ſuch food between theſe teeth.

The bodies of the *molary* teeth in general are almoſt ſquare, and flat at their extremities, tho' they are nevertheleſs furniſh'd with ſmall eminences and cavities; this diſpoſition renders them very proper to break and bruiſe the hardeſt aliments; they alſo perfect the diviſion of thoſe which have eſcaped the action begun by the *inciſory* and *canine* teeth.

The *inciſory*, the *canine*, and the moſt anterior of the *molary* teeth have generally but one root, whereas the

the others have two or three, ſometimes four, and very rarely five. It is obſervable that the laſt *Molaries* in both jaws are leſs than the two teeth which precede them, and have generally but two roots almoſt continually united with each other in all their extent. The *Socket* which receives a tooth with ſeveral roots, has as many particular lodges as the tooth has roots, and theſe different lodges are ſeparated from each other by a bony ſubſtance which appears to be ſpongeous.

The *molary* teeth in the upper jaw generally have their roots more diſtant at their extremity than thoſe of the inferior jaw; ſometimes ſome of theſe roots, which are very diſtant at their baſe near the body of the tooth, are afterwards crooked in ſuch a manner as to touch one another at their extremities or points. Theſe are the teeth, commonly call'd *barred*, ſo difficult and dangerous to be drawn, on account of the neceſſity of bringing along with them the bony ſubſtances which poſſeſs the interſtices of the roots.

The roots of the teeth are hollow in all their extent; and we obſerve that this cavity diminiſhes with age: It is lined with a membrane which ſerves as a ſheath to the veſſels included in it, which are a nerve, an artery, and a vein. The body of the teeth is compoſed of two ſubſtances; the moſt interior appears the ſame with that which compoſes the root, and the moſt external on the contrary differs very much from it, ſince it is very white and ſo hard that the graver and the file have little or no effect on it. This ſubſtance is call'd the *enamel* of the teeth, which is no more than the third of a line in thickneſs, and which is formed before the tooth appears without the ſocket. When the *enamel* is once worn off it is never repair'd, by which means the internal ſubſtance of the teeth being more eaſily penetrated by external bodies becomes more ſenſible of cold and heat, and is conſequently more diſpoſed to become carious.

The teeth are joined with the jaw bones by that ſpecies of *Synarthroſis* call'd *Gomphoſis*, that is to ſay, they are enchaſed in the ſockets by their roots, where they are fixed by the gums, which adhere cloſely to the necks of the teeth. The gums have a particular ſpring as well as the ſockets; and it is by this ſpring that we can account how a tooth put into its ſocket immediately after it has been drawn is again faſten'd and remains all the patient's life. It is to be obſerv'd, that the roots of all the teeth are cover'd with a *Perioſteum* as well as the other bones.

It rarely happens that the teeth appear without their ſockets before children are born; and when they are infants of a ſtrong conſtitution as to ſhoot forth teeth before their birth, theſe are only one or two of the *Inciſores*. If we examine the jaws of a young ſubject whoſe teeth are as yet included in their ſockets, we obſerve at once, that theſe ſmall lodges are ſhut up by the gums, which at firſt appear as it were tendinous and do not become ſoft, tender, and red till about the ſixth or ſeventh month. The gum being removed, and the ſocket uncover'd, we find, as it were, as many buds as there are ſockets. Every bud appears under the form of a membranous veſicle, interſperſed with an infinite number of ſanguiferous veſſels, which ſupply in its cavity, the mucilaginous or gelatinous humour found in it; this humour tranſpires thro' the pores of the veſicle, and diffuſing itſelf on its external ſurface, there forms the firſt bed or *Stratum* of each tooth. This *Stratum* becoming hard aſſumes the form of the body of the tooth which it is to produce.

We may eaſily conceive that the new *Strata*, or beds ſucceeding the firſt and receiving the ſame modifications, will not fail by their mutual union, to form the body and even the root of the teeth. We may alſo conceive that in proportion as the bulk of the tooth is augmented, the gum muſt be compreſſed, ſtretch'd,

ſtretch'd, and even divided by the effort which the tooth makes againſt it. We need not be ſurpriz'd that the gum ſhould be ſooner divided by the *inciſory* than the *molary* teeth, when we reflect that the latter are blunt and the former cuting. When we conſider that the gum is compoſed principally of the union of the perioſteum of the jaws with the internal membrane of the mouth, we need not be ſurpriz'd that the eruption of the teeth ſhould be accompanied with pain, a fever, and other violent ſymptoms. To deliver the infant from the fatal effects of theſe ſymptoms, the author of nature has ſo order'd it, that the teeth ſhould not cut the gums all at once. In a word, we obſerve that their eruption generally begins about the ſixth, ſeventh or eighth month, and ſometimes later, in the inferior jaw, by one of the *Inciſores*, which is moſt anterior or neareſt to the *Symphyſis*; fifteen days after the next tooth appears; the two moſt anterior inciſors of the upper jaw appear ſome days after; then two appear in the lower jaw at the ſide of the former, and then other two appear in the upper jaw: The four firſt in the lower jaw having appeared, the two inferior and the two ſuperior canine alſo ſhoot forth: This is the general order in which theſe teeth appear.

The *Molares* do not appear till children are about two years of age, at which time four ſhoot out of the inferior and four out of the ſuperior jaw. Thus children have twenty teeth when they are two years old or thereabout, and theſe are call'd the *Milk Teeth.*

The child remains in this ſituation till about the ſeventh year of its age; and then four others appear behind the former: And at fourteen years of age other four ſhoot out, and about the twentieth year of age we ſee the *Dentes Sapientiæ* appear, which make in all thirty-two: Sometimes theſe laſt teeth do not appear till the age of fifty, and even later.

At

At the age of ſeven or eight, the *Inciſory*, the *Canine*, and the firſt *Molares* are ſhed in the ſame order as they appeared. In order to conceive the true cauſe of ſheding theſe teeth, it is to be obſerved that the firſt twenty are double, ſo that in proportion as the ſecond tooth grows, it muſt neceſſarily puſh the firſt, till it yields a place for it: The firſt ſometimes reſiſting the preſſure of that which ſucceeds it; this ſecond pierces the gum ſometimes externally and ſometimes internally, and appears crooked. The firſt tooth being drawn, or coming out of itſelf, the new tooth gradually becomes ſtreight and takes the ſame place which the firſt poſſeſſed; which proves the neceſſity of drawing the firſt teeth when they are in the leaſt looſe.

The teeth not only ſerve to divide the aliment and adorn the mouth, but alſo contribute to the pronunciation of certain letters. This laſt uſe principally regards the *inciſory* and *canine* teeth *.

Repetition of the cavities found in the Head.

The cavities obſervable in the head, are, *Holes*, *Canals*, *Foſſæ* or *Ditches*, *Sinuſes*, *Sciſſures*, and *Grooves*; theſe are either internal or external, common or proper, and in number odd or even.

The internal holes, ſo call'd becauſe they penetrate into the *Cranium*, are twenty eight in number, fourteen on each ſide, to wit, the *Olfactories*, the *Opticks*, the *Lacerata Anteriora*, the ſuperior *Maxillaries*, the inferior *Maxillaries*, the *Parva rotunda*, the *Auditories*, the *Lacerata poſteriora*, the *Maſtoideans*, the anterior *Condyloideans*, the poſterior *Condyloideans*, and thoſe of the *Parietals*; to which we muſt add the internal *Orbitaries*, and the holes obſervable in the anterior ſurface of the ſtoney *Apophyſes* which communicate

* See *Le Chirurgien Dentiſte par* Mr. *Fauſhard Chir. Dentiſte.*

municate with the *Aqueduct* of *Fallopius*. Of theſe holes there are eight common; namely, the anterior and poſterior *Lacerata*, the internal *Orbitaries*, and moſt commonly the *Maſtoidæans*.

Beſides theſe there are two internal holes, to wit, the great *Occipital Hole* and the *Spinal Hole*.

The *external Holes* are only fifteen in number; namely, the *Superciliaries*, the *external Orbitaries*, the *poſterior Palatines* (by ſome call'd the *Guſtatonis*), the *Pterygodeans*, the *Spheno-palatines*, the *Stylo-maſtoideans*, thoſe of the *Chin*, to which we ought to add the *inciſory*, or the *anterior Palatine*.

There are four internal canals; namely, two for the *carotid* arteries, and other two call'd the *Aqueducts* of *Fallopius*.

There are ten external canals, five on each ſide; namely, the *Naſal*, the ſuperior *Maxillary*, the inferior *Maxillary*, which correſponds to the external ear, and the *Tube* of *Euſtachius*.

There are two internal fiſſures call'd ſphenoidals, and two external call'd ſpheno-maxillaries.

There are nine internal foſſæ; namely, two *Coronals*, two *Temporals*, four *Occipitals*, one *Pituitary* or the *Saddle*.

There are thirteen external foſſæ; namely, two *Orbitaries*, two *Naſals*, two *Pterygoideans*, two *Maxillaries*, two *Temporals*, two *Jugulars*, and one *Palatine*.

In the inſide of the *Cranium* we are to conſider eleven *Sciſſures*; namely, one *Coronal*, that which runs along the *ſagittal* ſuture, all thoſe of the *Parietals*, which are only counted for one, two in each *temporal* bone, and three in the *Occipital*.

There are ſix external *Sinuſes*, three on each ſide; namely, two *Frontals*, two *Maxillaries*, aad two *Sphenoidals*; to which we may add the cellules of the *ethmoide* bone, and thoſe of the *maſtoide Apophyſis*.

We

We ſhall afterwards examine the uſe of all theſe different cavities; ſince each of them has its peculiar and known uſe, except thoſe holes of the *Cranium* call'd the *Lacerata Anteriora*, which are ſhut up by the dura mater.

Of the Os Hyoides.

The *Os Hyoides* being joined with the temporal bones, as I ſhall afterwards ſhew, its deſcription ought neceſſarily to follow that of the bones of the head. It is ſituated at the root of the tongue to which it ſerves as a ſupport, being cloſely united with it: It is alſo joined to the *thyroide* cartilage of the *Larynx*, which forms the eminence commonly call'd the *Pomum Adami*, above which the *Os Hyoides* is placed.

In this bone we are to conſider three parts, namely, a baſe and two horns. The baſe is the principal piece of this bone; its anterior ſurface is convex, and its poſterior concave. The horns are two long and ſomewhat round bones; at their anterior extremities they are joined to its baſe by means of a cartilage, and at their poſterior extremities they are fixed to the ſuperior horns of the *thyroide* cartilage by two round ligaments which are pretty ſtrong.

We ought alſo to conſider the appendices of this bone; they are raiſed above the union of the horns with the baſe; and are by ſome call'd the ſmall horns: They are ſometimes cartilaginous and ſometimes bony. From each of their extremities ariſes a very long ligament, which advances to the *Styloide Apophyſes*, where it terminates.

CHAP. IV.

Of the Trunk.

THE ſecond part of the *Skeleton* is named the *Trunk*, and comprehends the *Spine*, the *Thorax*, and the *Baſon* or *Pelvis*.

ARTICLE I.

Of the Spine.

THE *Spine* is a bony column, compoſed of ſeveral pieces named the *Vertebræ*, the *Os ſacrum*, and of the *Coccyx*. The *Vertebræ* are twenty-four in number, that is to ſay, ſeven *Cervical*, twelve *Dorſal* and five *Lumbar*.

We muſt conſider in general, in each *Vertebra*, except the firſt of the neck, 1. A *Body* which is placed in the anterior part. 2. Seven *Apophyſes*; namely, one *Spinal*, which is ſituated poſteriorly, two tranſverſe placed on the ſides, and four oblique, of which two are ſuperior and two inferior. 3. Four grooves, ſituated between the *Body* and the *oblique Apophyſes*, and diſpoſed in ſuch a manner, that when we join two *Vertebræ* together, the ſuperior grooves of the one uniting with the inferior grooves of the other, form on each ſide an aperture which communicates with the ſpinal duct, which is formed by the union of the holes which run thro' the thickneſs of each vertebra; 'tis in this duct or canal that we find the *ſpinal Marrow* included, and it is thro' theſe lateral *Apertures* that the nerves go to diſtribute themſelves thro' different parts of the body. In moſt of the *Vertebræ* we alſo obſerve five *Epiphyſes*; namely, two on the body of the *Vertebra*, one on each tranſverſe *Apophyſis*, and one on the ſpinal *Apophyſis*.

The bodies of the vertebræ are gradually diminiſhed from the laſt of the loins to the firſt of the neck; which gives the ſpine nearly a *pyramidal* figure; and if we view its lateral parts we perceive that inſtead of deſcribing a right line, it forms various inflections: The *Vertebræ* of the neck, for example, bend forwards as well as thoſe of the loins, and the coccyx; thoſe of the back on the contrary bend backwards as well as the *Os ſacrum*. The vertebræ of the neck have this in particular, that their tranſverſe *Apophyſes* are perforated, and their ſpinal furcated; and that the body of the five laſt is concavè in the ſuperior part, and ſomewhat convex in the inferior: We ought however to except the ſeventh, whoſe body is not convex in the inferior part, and whoſe ſpinal *Apophyſis* is not furcated.

The firſt *Vertebra* commonly call'd *Atlas*, has no body, and only forms a kind of bony ring: It has no ſpinal *Apophyſis*, but inſtead of the ſpine there is a ſmall and pretty rough eminence. The aperture of this vertebra is much larger than thoſe of all the others; for it receives not only the *ſpinal Marrow*, but alſo the *odontoide Apophyſis* in form of a *Pivot*, which the ſecond vertebra produces by the ſuperior part of its body, and whoſe extremity is join'd to the anterior and internal part of the large hole of the *Occipital* by two ſtrong ligaments. In the middle of the anterior part of this vertebra we obſerve an eminence, and in its internal ſurface oppoſite to this eminence, we perceive a ſuperficial cavity on which the *odontoide Apophyſis* is ſupported. The oblique *Apophyſes* of this *Vertebra* are placed much more anteriorly than thoſe of the *Vertebræ* of the neck, except the ſuperior of the ſecond, which are upon the ſame line: We alſo obſerve that theſe *Apophyſes*, as well ſuperior as inferior, are hollow, which renders them different from the other *Vertebræ* of the neck, whoſe ſuperior oblique *Apophyſes* are prominent, and

the inferior concave; but beſides that the ſuperior oblique *Apophyſes* of the firſt *Vertebra* are much larger than any other, they are alſo much deeper, that they may the better receive the *Condyles* of the *Occipital*; and it is by means of this articulation that the head performs the ſmall motions of flexion and extenſion; its ſemicircular motions to the right and left depends principally on the articulation of the firſt *Vertebra* with the ſecond by its *odontoide Apophyſis*. We obſerve internally, on each ſide of the great holes of the firſt *Vertebra*, certain inequalities to which is fixed a very ſtrong tranſverſe ligament, which paſſes behind the *odontoide Apophyſis*, in order to retain it in its ſituation during the ſemicircular motions of the head: Immediately behind each ſuperior oblique *Apophyſis* of the firſt *Vertebra*, we find a conſiderable groove, by which the vertebral arteries which have paſſed thro' the holes of the tranſverſe apophyſes of the vertebræ of the neck, are defended from the compreſſion which they might have otherwiſe ſuffered during the extenſion of the head.

The ſecond *Vertebra* is call'd the *Epiſtropheus* or *Axis* on account of its *odontoide Apophyſis*, on which the firſt vertebra, together with the head, turns upon the right and left, as on a *Pivot*. This *Vertebra* has a more conſiderable body than all the others of the neck: Its ſuperior oblique *Apophyſes* are ſituated more anteriorly than the inferior, and theſe laſt are a little concave, whereas the ſuperior are ſomewhat prominent. The inferior part of the body of this *Vertebra* is a little convex, and its ſpinal *Apophyſis* is more prominent than that of the four vertebræ below it. We alſo obſerve that the holes of the tranſverſe apophyſes of this *Vertebra* are oblique; whereas thoſe of the other *Vertebræ* are perpendicular.

The five laſt *Vertebræ* of the neck have nothing particular but what I have ſaid in order to diſtinguiſh them

them from all the reſt: It is only to be obſerved that the laſt has its tranſverſe as well as ſpinal *Apophyſis* longer; the ſpinal has no bifurcation, and the body of this vertebra is not convex at its inferior part.

The *Vertebræ* of the back have their bodies thicker behind and before than on the Sides. The ſpinal *Apophyſes* of theſe *Vertebræ* have a kind of creſt along their ſuperior part, and a groove below; they terminate in points, and are laid over each other, except the firſt, which is blunter, and more prominent than the others; the ſpines of the three laſt of theſe vertebræ are leſs crooked, ſhorter, and blunter than thoſe of the others.

The tranſverſe *Apophyſes* of theſe vertebræ are ſituated more backwards than thoſe of the *Vertebræ* of the neck and loins; and their length diminiſhes from the firſt to the twelfth. Anteriorly in the extremity of the ten ſuperiors there is a ſuperficial cavity for their articulation with the ribs. In the lateral parts of the bodies of the dorſal vertebræ we are to conſider thoſe ſmall cavities deſtin'd to receive the *Condyles* of the ribs: Theſe cavities are not entirely formed on the body of each ſingle vertebra (except thoſe which ought to receive the firſt, the eleventh, and the twelfth rib) the half of each cavity being formed upon the edges of two vertebræ whoſe union forms the entire cavity.

The oblique *Apophyſes* of the dorſal *Vertebræ* are almoſt perpendicular; the ſuperior have their ſurfaces turned backwards and the inferior forwards. It is, laſtly, to be obſerved, that the oblique apophyſes both ſuperior and inferior of the twelfth *Vertebra* are prominent; whereas the eleven ſuperior of the back, and the ſixth inferior of the neck, have only their ſuperior oblique *Apophyſes* prominent and their inferior concave.

The vertebræ of the loins which are five in number, have a more conſiderable body than all the reſt; their ſpinal *Apophyſes* are ſtraight, flat, and a little diſtant from each other. The ſame holds true of the tranſverſe, which are alſo ſtraight, flat, and pretty long: The length of theſe laſt generally augments from the firſt to the third, and afterwards diminiſhes to the laſt. The oblique *Apophyſes* of theſe vertebræ are ſituated perpendicularly; the ſuperior are concave and turn'd backwards, whereas the inferior are prominent and turn'd forwards.

Among all the *Vertebræ*, there are none except thoſe of the loins, in which the eminences and cavities of their oblique apophyſes are remarkable; for in all the other vertebræ, except the firſt of the neck, their oblique apophyſes preſent us with little elſe than flat and ſmooth ſurfaces, almoſt without any appearance either of an eminence or a cavity.

The *Os ſacrum* ſerves as a baſe to the ſpine; its figure is triangular; at its broadeſt part it is join'd to the laſt vertebra of the loins, and at its narroweſt part to the *Coccyx*. The *Os ſacrum* is compoſed of five pieces, and ſometimes of ſix, which can only be ſeparated in young ſubjects; for in adults we can hardly diſcover the marks of their union: Theſe pieces have ſome reſemblance to the *Vertebræ*, for which reaſon ſome authors call them by the ſame name. The anterior ſurface of this bone is concave and pretty ſmooth, whereas the poſterior is convex and rough. In theſe two ſurfaces, there are two rows conſiſting of four holes each, the whole of which communicate with the canal form'd in the thickneſs of this bone: We alſo obſerve that the anterior holes are larger than the poſterior, and that they are open to afford a paſſage to ſeveral nerves, which have come thro' the canal of the *Os ſacrum*, and which, by their re-union, form the moſt conſiderable cord in the human body, call'd the *Soiatic Nerve*.

Nerve. The poſterior holes are cloſed up by membranous ligaments, and there are only ſome filaments of nerves which come out from theſe apertures, croſſing the membranes which cloſe them up, in order to be diſtributed thro' the adjacent parts. In the poſterior ſurface of the *Os ſacrum*, we are, beſides the holes and apertures of the canal, to conſider ſeveral eminences and cavities. Of theſe eminences there are five which have particular names; the two firſt are call'd oblique, and are hollow, to receive the inferior oblique apophyſes of the laſt *Vertebra* of the loins: The third eminence, call'd the *Spine*, runs along the ſuperior and middle part of this bone, and its inferior portion is partly formed by membranous ligaments. The two other eminences are call'd horns, and correſpond to two ſimilar eminences of the coccyx with which they are joined by means of two ligaments; beſides theſe eminences, we alſo find on each ſide of the *Os ſacrum* a ſurface, which is rough, ſomewhat oblong, and cover'd with a cartilage which joins it to the *Oſſa Ilia*. Laſtly, in this bone we obſerve four grooves, the ſuperior of which correſpond to the inferior of the laſt vertebra of the loins, and form on each ſide by their union, a hole for the paſſage of two nerves which come from the ſpinal marrow; the inferior alſo form a hole on each ſide, by uniting with two ſimilar grooves which are at the ſuperior part of the coccyx; and theſe holes alſo afford a paſſage to ſome nerves.

The *Coccyx* is of a triangular figure, and is at its broadeſt part join'd to the blunt point of the *Os ſacrum*, and both theſe together form but one triangle. In adults the *Coccyx* forms but one piece, whereas in infants it conſiſts of three or four. In the ſuperior part of the *Coccyx* there are two horns, and two grooves, as I have before obſerved.

The connexions of the *Spine* are diſtinguiſh'd into common and proper: Thoſe are call'd common, which the *Spine* has with the adjacent parts, ſuch as the *Occipital*, the *Ribs*, and the *Oſſa Ilia*. The proper connexions are thoſe which the different pieces of the ſpine have with each other. Theſe laſt are of two kinds. The firſt is that which joins the *Vertebræ* by their bodies; the laſt of the loins to the *Os ſacrum*, and the *Os ſacrum* to the *Coccyx*. This connexion being form'd by means of cartilages and ligaments, may be call'd *Syneuro-Synchondroſial*. The ſecond proper connexion of the *Spine*, comprehends thoſe which all the *Vertebræ* have among themſelves, by means of the oblique *Apophyſes*, and the laſt of the loins with the *Os ſacrum*, by the ſame eminences which may be referred to the *Ginglymus* of the ſecond ſpecies.

The *Cartilages* which unite the bodies of the *Vertebræ* have this in particular, 1. They cover the whole ſurface of the body of each *Vertebra*. 2. They have but a ſmall conſiſtence, and are maintained in that ſtate, by a kind of mucilage found between each two *Vertebræ*. 3. Theſe cartilages are thicker before than behind; and they are more ſo, in proportion as the *Vertebræ* which they unite, are deſtin'd for conſiderable or violent motions. This is obſervable in the vertebræ of the neck, and ſtill more ſo in thoſe of the loins.

As for the ligaments of the *Spine*, we diſtinguiſh them into two ſorts, without reckoning thoſe which join the oblique *Apophyſes*. Some are external, and others internal: The firſt may be divided into four claſſes. Under the firſt is comprehended a *ligamentary Band* which externally covers the body of the vertebræ, to which it is cloſely united; and this band extends from the firſt *Vertebra* of the neck to the *Os ſacrum*. Thoſe of the ſecond claſs, are the ſmall ligaments which croſs each other. Theſe are

fixed

fixed to the edges of each *Vertebra*, and cover the cartilages which join them with each other. The third and fourth claſſes comprehend the ligaments which fix the *ſpinal Apophyſes* to each other, and perform the ſame office with reſpect to the *tranſverſe*.

Among the internal ligaments we count a pretty ſtrong kind of *ligamentary Twig*, which lines the whole internal ſurface of the canal, to which it adheres very ſtrongly. It repreſents a pretty long funnel, its cavity being equal to the diameter of the great hole of the *Occipital* where this ligament begins, and running in a point towards the extremity of the *Os ſacrum*.

This ligament is externally cover'd, in its ſuperior part, with many ſtrong fibres, which are as it were glew'd to it. Theſe fibres are on one ſide fixed to the great hole of the occipital, and on the other to all the circumference of the firſt vertebra. This ſpecies of ligamentary covering fortifies not only the internal ligament, but alſo the articulation of the *Occipital* with the firſt *Vertebra*. I ſhall ſay nothing of two ſtrong ligaments which riſing from the *odontoide Apophyſis* of the ſecond *Vertebra* are at laſt fix'd to the anterior part of the great hole of the *Occipital*, nor of the *tranſverſe* ligament of the firſt vertebra of the neck, which fixes that eminence in its ſituation, becauſe I have mention'd them elſewhere.

But beſides theſe ligaments there is between the roots of the *ſpinal Apophyſes* of each *Vertebra* a flat, yellowiſh, and very elaſtic ligament, which fixes them cloſely to each other; this ligament particularly fills the poſterior *Grooves* of the *Vertebræ*.

As for the ligaments of the *oblique Apophyſes* they are fixed to the circumferences of theſe eminences, to keep them in a ſtate proper for the motions of the *Spine*; and they alſo prevent the diſcharge of the ſynovia, which continually moiſtens the carti-

lages, with which the ſurfaces of theſe apophyſes are cover'd.

The *Spine* is not only deſtin'd to form a canal for including the continuation of the *medulla oblongata*, from which (as I have already obſerv'd) a great many nerves proceed, and are diſtributed thro' their proper parts; but it is alſo to be conſider'd as the general prop and ſupport of the principal parts belonging to the human fabrick. Three things render the ſpine capable of anſwering theſe ſo important uſes, 1*ſt*. Its ſtrength. 2*d*. Its flexibility, And, 3*d*. Its lightneſs. The ſpine is rendered firm by the particular diſpoſition of the bodies of the vertebræ, which by touching each other in flat, and pretty extenſive ſurfaces, eaſily prove a mutual ſupport to one another. We are alſo to conſider the cartilages which unite them, and the great number of ligaments which fortify this union.

The flexibility of the *Spine* depends upon the great number of pieces which compoſe it, and on the cartilages which unite them; and laſtly, its lightneſs depends on the internal ſtructure of the pieces which compoſe it, the greateſt portion of which is ſpongeous.

From the diſpoſition of the cartilages, which unite the vertebræ with each other, we learn the reaſon why the human body grows ſhorter, after it has been long in an upright poſition, or during a journey, and why it recovers its former length, after lying in bed for a proper time; and, in a word, why in the morning when a man gets out of bed, his body is taller by ſeveral lines, than at night when he lies down. The cartilages which unite the *Vertebræ* being flexible, elaſtick, and for the moſt part very thick, 'tis eaſy to conceive that the *Spine* muſt loſe ſome of its length, in proportion as its cartilages are more or leſs compreſſed by the weight of the ſuperior parts, which happens when a perſon

ſtands

ſtands upright; and that it muſt neceſſarily become longer by the ſpring of its cartilages, when a perſon is in bed, the force which compreſſed them, then ceaſing to act. For the better explication of this alternate elongation and ſhortening, we may inſtance in the compreſſion which the different bony pieces compoſing the inferior extremities undergo, at the parts where they are articulated, by the weight of the ſuperior parts; and laſtly, in the ſoles of the feet becoming flat by the weight of the body *.

ARTICLE II.

Of the Thorax.

THE *Thorax* or *Breaſt* is a cavity form'd partly by the *Sternum*, the *Ribs* and the *Vertebræ* of the back. The *Sternum* is that bone, which conſtitutes the middle of the anterior part of the *Thorax*. It ſerves as a ſupport on each ſide, to the ſeven ſuperior *Ribs*, to the *Clavicles*, &c. In children it is compoſed of four or five pieces. But in adults it only conſiſts of two which are joined by a cartilage. The firſt or ſuperior part of the ſternum, in ſome meaſure reſembles a triangle whoſe angles are blunt, obtuſe, and as it were cut off. In this part we are to conſider two ſurfaces, one external, and gently convex, and the other internal, which is ſomewhat concave. In the middle of its ſuperior part, towards its internal ſurface, we obſerve a *Groove*, by ſome call'd the *Fork*. Along its lateral parts, there are alſo three other grooves, the ſuperior and moſt conſiderable of which receives one of the two extremites of the clavicle, and the two others, the cartilaginous portion of the two firſt ribs. The ſecond piece of the *Sternum* is double

* See on this ſubject the Memoirs of the Royal Academy of Sciences for Ann. 1725.

the

the length of the firſt, and is broader below than above. In this piece we are to conſider two ſurfaces, which are a little concave, and along its lateral parts, we find ſix ſmall grooves to receive the cartilaginous portion of the ribs which correſpond to them. It is however to be obſerved, that the firſt of theſe grooves is common with the inferior one of the firſt piece, which makes no more than eight grooves along each ſide of the *Sternum*; namely, one for the clavicle, and the reſt for the ſeven ſuperior ribs.

At the lower end of the *Sternum* there is a third piece which remains long cartilaginous, but afterwards oſſifies, at leaſt in part; and we may look upon it as an appendix of the *Sternum*. It is call'd the *Xyphoide Cartilage*, and lies in that part which the vulgar call the pit of the ſtomach. Its figure is not always the ſame, for in ſome it terminates in a ſingle point like that of a ſword, and in others its point is double.

The *Ribs*, whoſe number is twelve on each ſide, for the moſt part, are as many irregular ſemicircles, each compoſed of two portions, one bony and another cartilaginous, the laſt of which is next to the ſternum. In the bony portion of each rib we are to conſider two ſurfaces, one external, which is convex, and another internal, which is concave. We are alſo to conſider the middle, which is the body of the rib, and its two extremities, one of which is anterior and the other poſterior; neither muſt we forget the ſuperior and inferior part of the rib. In the anterior extremity, there is a cavity to receive the cartilaginous portion; and the poſterior terminates in an eminence, call'd *Condyle*, which is round in the firſt, the eleventh, and the twelfth ribs; but in all the reſt it has two ſurfaces ſeparated by a ſmall eminence. In the external ſurface of the ten ſuperior ribs, and at a ſmall diſtance from the condyle,

condyle, we find an eminence call'd a *Tuberoſity*. It is to be obſerved that in the ten inferior ribs, the ſuperior is thicker than the inferior part. But it is quite the reverſe in the two ſuperior ribs.

In the ſuperior as well as in the inferior part of the ribs we alſo diſtinguiſh two *Lips*, one external, and the other internal. In the internal ſurface of each rib, except the two firſt, we find a ſciſſure which reaches from the *Tuberoſity* to about the middle of the rib. 'Tis to be obſerved, that beſides the *Tuberoſity* which, as I have ſaid, is found on the external ſurface of the ten ſuperior ribs; we find alſo in the external ſurface of all the ribs except the firſt, an eminence which projects but little, and advances ſomewhat beyond the inferior edge of the ribs, ſo that in this place, the ribs form a kind of angle, for which reaſon ſome moderns call this eminence the *Angle of the Ribs*.

The *Ribs* are divided into *true* and *falſe*. The *true* are the ſeven ſuperior in each ſide; and the *falſe* the five inferior.

The *true Ribs* are joined to the *Sternum*, by their cartilaginous portion, but the *falſe Ribs* do not touch this bone; for the cartilage of the firſt of the *falſe* is joined to that of the laſt of the *true*, the cartilage of the ſecond *falſe* to that of the firſt, and the cartilage of the third *falſe* to that of the ſecond. As for the cartilaginous portion of the two laſt ribs, it does not touch the cartilages of the adjacent ribs, except by very lax ligamentary fibres, for which reaſon they are call'd *fluctuating Ribs*.

The cartilage of each true rib, except that of the firſt, is joined to the ſternum by *Diarthroſis*. In a word we obſerve, that the extremity of the cartilages which correſponds to the *Sternum*, forms a ſmall round head, which is received into a cavity of the ſternum proportioned to it, and which is cover'd, as well as all thoſe ſubſervient to the move-

able

able articulations, with a ſmooth and even cartilage, upon which the portion of the rib received into it, may move, being ſecured there by ſmall ligaments.

As for the cartilage of the firſt rib, it is join'd to the ſternum by a kind of groove, which does not permit the rib to move on that ſide.

The cartilages of the ſix ſuperior ribs leave very diſtinct ſpaces between them; whereas, thoſe of the ſeventh, eighth and ninth ribs, are ſo cloſe that they hardly leave any vacuity between them.

The length of the cartilages of the ribs is not the ſame in all, no more than that of their oſſeous portion; ſince we find that both theſe augment from the firſt to the ſeventh true rib, and are afterwards diminiſh'd to the laſt of the falſe. It is alſo obſervable, that the bony portion of the ribs is not equally incurvated in them all, their curvature being diminiſh'd from the firſt to the laſt.

The joining of the ten ſuperior ribs with the *Vertebræ* of the back, is a ginglymus with two heads, which does little more than permit them to be raiſed and depreſſed. We obſerve, however, that when the ribs are raiſed they recede from each other, that is to ſay, thoſe on the right ſide in elevating themſelves retire from thoſe of the left, which ſeems to depend at leaſt as much on the particular figure of the ribs, and their oblique ſituation, as on their articulations. I ſay on their oblique ſituation, for it is to be obſerv'd, that all the ribs are ſituated obliquely from above downwards, except the two firſt true ribs whoſe ſituation is almoſt horizontal. It is alſo to be conſidered, that the middle ſubſtance of their cartilaginous portion permits them to yield at that time. As for the two laſt falſe ribs, they have a freer motion than all the reſt, becauſe they are only join'd to the bodies of the *Vertebræ* by an eminence which terminates them poſteriorly. In a word, the motion of the ribs ſeems

to

to be gradually more free and unconfin'd in proportion as we advance to the loweſt.

The joining of the ten ſuperior ribs with the *Vertebræ* of the back which correſpond to them, is fortified by ſeveral ſmall, and pretty ſtrong ligaments, which cover the capſular membrane of the articulation of the *Condyle* of each rib, with the bodies of theſe *Vertebræ*, as alſo that of the articulation of the *Tuberoſity* of the ſame ribs, with their *tranſverſe Apophyſes*. Theſe ligaments are fixed to the adjacent aſperities of the articulation. As for the two laſt ribs, which have no articulation with the *tranſverſe Apophyſes* of the *Vertebræ* of the back, but only with their bodies, we obſerve that the eleventh is join'd to the *tranſverſe Apophyſis* of the *Vertebra* which correſponds to it, by ſeveral ligamentary fibres, and, that with reſpect to the laſt rib, it has a particular connexion with the *tranſverſe Apophyſis* of the firſt *Vertebra* of the loins, by a pretty broad ligament, which is fixed to two thirds of the inferior edge of that rib.

ARTICLE III.

Of the Pelvis or Baſon.

THE *Pelvis* or *Baſon* is a cavity form'd partly by two large bones, call'd the *Oſſa innominata* or the two haunch bones, which are join'd before, and behind fixed to the *Os ſacrum*, which compleats this cavity. Each *Os innominatum* is form'd of three pieces, which are eaſily ſeparated in young ſubjects, being only join'd by a cartilage which is not generally oſſified till people are about twenty years of age. The firſt or ſuperior of theſe pieces is call'd the *Ilium* or the *Os ilium*. The ſecond or inferior is known by the name of *Iſchium*, and the third which is anterior and the ſame time the ſmalleſt, is call'd the *Os pubis*. Theſe three pieces, but principally

pally the *Iſchium*, concur to form the *cotyloide* cavity. Anteriorly the *Os pubis* with the *Ilium* form a conſiderable hole call'd *oval*. The *Os pubis* with the *Ilium*, forms in the baſon a creſt, or prominent line, which is divided into two portions, one ſuperior, which is call'd the upper part of the baſon, and the other its bottom; and the *Os ilium* with the *Iſchium* forms alſo poſteriorly, on each ſide, a large groove call'd *Iſchiadic*.

In the *Os ilium* we are to conſider two ſurfaces, one external, and another internal. The exterior is convex anteriorly, and concave poſteriorly. The internal is concave and ſmooth in its anterior and middle part, and convex and rough in the poſterior, where there are two eminences, the anterior of which being left prominent, is join'd to the *Os ſacrum* by an intermediate cartilage.

This bone terminates in a ſemicircle in its ſuperior part call'd *Creſt* or *Rib*, which is an *Epiphyſis* in children, and ſometimes alſo in adults. It is cover'd with a cartilaginous ſubſtance, and the edges of the creſt are call'd *Lips*, one of which is *external*, and another *internal*. In this bone we alſo find four *Spines*, two anterior and two poſterior. The anterior are ſeparated from each other by a groove, and the ſame holds true of the poſterior. The *Os ilium* by its inferior part concurs to the formation of the *Iſchiadic* groove and the *cotyloide* cavity. Beſides this, we obſerve a *Sinuoſity* in the interior ſide of its anterior and inferior ſpine; and laſtly, we find in its interior and inferior part a kind of prominent creſt or line, which unites with a ſimilar one form'd by the *Os pubis*; and theſe two creſts united, as I have before obſerv'd, divide the *Pelvis* into two portions.

The ſecond piece of the *Os innominatum*, call'd the *Iſchium*, has a body and a branch. In the body are two eminences, one of which is call'd the *Spine*,

and the other the *Tuberoſity*. This laſt is an *Epiphyſis* in children, and ſometimes alſo in adults. It is cover'd with a cartilaginous ſubſtance, which is continued along the internal ſurface of this bone, and advances to the cartilage which joins the *Oſſa pubis*. We alſo obſerve in the *Os iſchium* two *Sinuoſities* and two *Grooves*. One of the *Sinuoſities* lies between the *Spine* and the *Tuberoſity*; and the other, at the anterior and ſuperior part of this laſt eminence. Of the *Grooves* one helps to form the *foramen ovale*, and the other is found at the interior edge of the *cotyloide* cavity. We are alſo to conſider the *Groove* which helps to form the *iſchiadic* groove. The branch of the *Iſchium* is an *Apophyſis*, which is join'd to another of the *Pubis* for the formation of the *foramen ovale*.

The third piece of the *Os innominatum*, call'd the *Pubis*, may be divided into a body and two branches. The ſuperior and moſt conſiderable is ſituated tranſverſely, and is hollow'd at its extremity for the formation of the *cotyloide* cavity. In its ſuperior part we obſerve a ſlight *Groove*, and a prominent line call'd the *Spine*, which unites with the *iliac line*; and theſe two in conjunction divide the *Pelvis* into two cavities, as I have before obſerved. In the inferior part of the ſame branch we perceive an oblique groove, for the paſſage of the veſſels which go to the adjacent muſcles. The inferior branch is united with that of the *Iſchium*. As for the body of the *Pubis*, beſides its groove for the formation of the *foramen ovale*, it has in its ſuperior part an eminence call'd a *Tuberoſity*; and all along its internal lateral ſide, we perceive inequalities for fixing the cartilage which unites the *Oſſa pubis* with each other, and this union is call'd the *Symphyſis* of the *Oſſa pubis*.

The edge of the cotyloide cavity is not equally raiſed in all its extent, for we obſerve that on the

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ſide of the *foramen ovale* there is a pretty conſiderable groove, which is cloſed up by a very ſtrong ligament, which leaves a ſmall vacuity for the paſſage of the veſſels which run to the *cotyloide* cavity. In the middle of this cavity we alſo perceive a particular depreſſion, which is continued to the groove. The cartilage, which covers the *cotyloide* cavity, does not cover this depreſſion; and the *mucilaginous Gland* which furniſhes the *Synovia* of this articulation is lodged in it.

The *cotyloide* cavity is deeper above and behind, than below and before, which depends on the particular diſpoſition of the edge of this cavity. But its capacity is augmented by a kind of ligamentary *Capſula*, which, as it were, ſurrounds the whole of its circumference.

The *Oſſa innominata*, beſides their mutual joining with each other, by means of the cartilages which unite the *Oſſa pubis*, and beſides their articulation by the *Ball* and *Socket*, have alſo a particular connexion with the *Os ſacrum*, which may be look'd upon as *Syn-chondroſial*, being form'd by means of a cartilage and ſeveral very ſtrong ligaments, which from the lateral and ſuperior parts of the *Os ſacrum* proceed, till they terminate poſteriorly at the *Oſſa ilia*. There are alſo two conſiderable ligaments which come from the *tranſverſe Apophyſes* of the laſt *Vertebra* of loins. But beſides all theſe ligaments, there are alſo two others on each ſide, which run from the *Os ſacrum* to the *Iſchium*. Theſe are call'd *Sacro-iſchiadic*, and are diſtinguiſhed either into external and internal, or into great and ſmall. The moſt conſiderable riſes from the lateral and ſuperior parts of the *Os ſacrum*, and by ſome fibres of the poſterior part of the *Os ilium*, deſcends obliquely to reach the *Tuberoſity* of the *Iſchium*, where it terminates by advancing as far as the branch of that bone. The internal and leaſt of theſe ligaments, derives its origin

from the lateral and inferior parts of the *Os ſacrum*, and from the ſuperior of the *coccyx*, after which it terminates at the ſpine of the *Iſchium*. In this paſſage it croſſes the firſt, with which it is cloſely united. Theſe two ligaments, by their meeting, cloſe up the inferior part of the *iſchiadic* groove. To theſe ligaments we ought alſo to add, that which ſhuts up the *foramen ovale*. I ſhall elſewhere mention the ligament of *Fallopius* or of *Poupartus*, by ſome call'd the *inguinal* ligament. As for the ligaments of the articulation of the *Femur* with the *cotyloide* cavity, we obſerve two of them; namely, one which ſurrounds the articulation, being fixed in one part, to the external edge of that cavity immediately beyond the *ligamentary Capſula*, and which after having embraced the portion of the head of the *Femur*, which correſponds to it, terminates at the end of its neck. It is call'd the *orbicular* ligament, and its thickneſs is conſiderable, eſpecially near the great *Trochanter*.

The ſecond ligament is included in the ſame articulation, and is call'd the *round Ligament*, tho' very improperly. It is a kind of flat cord which derives its origin from ſeveral fibres, ſome of which come from the particular depreſſion in which I have ſaid the *ſynovial* gland was lodged; and the reſt from the cotyloide groove. Theſe fibres, after being cloſely interwoven, in order to form the ligament, terminate obliquely in the ſmall cavity obſervable in the head of the *Femur*, not in its middle, but rather in its lateral internal part; ſo that by the particular ſituation of this ligament, as well on the ſide of the *cotyloide* cavity as on that of the head of the *Femur*, it cannot be compreſſed by the weight of the trunk in our different motions. This ligament is about an inch long, and about half a finger's breadth broad.

Theſe bones in conjunction with the *Os ſacrum*, are as it were the baſe and ſupport of all the other parts of the trunk, as alſo of the inferior extremities.

'Tis principally by an examination of the bones which compoſe the *Pelvis* that we diſtinguiſh the ſkeleton of a woman, from that of a man; and not by the *Cranium* whoſe ſagittal ſuture, ſome pretend, is in women continued to the root of the noſe. In a word, the *Pelvis* or *Baſon* is larger in women than in men, which depends not only on the hanch bones, which in women are generally wider than in men, but alſo on the *Os ſacrum* and the *Coccyx*, which generally recline farther backwards. The arch of the *Oſſa pubis* has alſo a greater extent than in men. The cartilage which joins theſe laſt bones together, is very flexible, tho' very thick; and thoſe cartilages which unite the *Oſſa ilia* to the *Os ſacrum*, and the *Os ſacrum* to the *Coccyx* are no leſs ſo.

This conformation ſo neceſſary for the facility of delivery, is not equally found in all women. We may judge to what difficulties in delivery thoſe women muſt be expoſed, who have not ſo advantageous a conformation, with which, however, delivery is not ſometimes exempt from difficulties. In a word, if the bulk of the child's head is more conſiderable than the bottom of the pelvis, we may eaſily conceive, that it cannot be brought away, but in as far as the bones which compoſe the pelvis, ſhall ſeparate ſufficiently to augment its capacity, which can only happen by the flexibility of the cartilages, which unite theſe bones; and by that of the ligaments, membranes, *&c.* which corroborate and fortify their union.

However neceſſary this ſeparation of the pieces of the *Pelvis* may ſeem, to facilitate delivery, yet two celebrated men mid-wives †, whom I have conſult-

† Mr. *Bourgeois* and Mr. *Puzos*.

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ed on this ſubject, are of opinion that ſuch a ſeparation is very rare, and hardly ever happens, except in young women, and not even in them except after a long and hard labour, that is to ſay, after the fœtus has ſuſtain'd ſtrong and reiterated compreſſions from the uterus, the abdominal muſcles, and diaphragm, all which produce in the mother, very intenſe pains, which would be even inſupportable, if the diſtenſion of the cartilages and ligaments which permit this ſeparation, was not gradually made, and in proportion as the infant paſſes thro' the pelvis. Theſe practitioners on the contrary look upon this ſeparation, not only as very difficult, but even as abſolutely impoſſible in women a little advanced in years. It is even ſometimes inſufficient in young women, whoſe *Pelvis* is conſiderably ſmall, eſpecially in its inferior part, on account of ſome particular diſorder, as in thoſe women who have a preternatural ſtructure of the parts, *&c.* the *Pelvis* being in ſuch caſes too narrow to afford a paſſage for the child, tho' of an ordinary bulk, whatever aſſiſtance the cartilages and ligaments may afford, which reduces practitioners to a neceſſity of having recourſe to art, in order to ſupply the defect of nature.

Tho' tis true that the ſeparation of the bones of the different pieces of the *Pelvis* is poſſible in ſome caſes, yet it muſt be granted that ſome of them, by the flexibility of the cartilages which unite them, are more diſpoſed to it than others; ſuch are the *Os pubis* and the *Coccyx*. I know a lady who at eighteen years of age had a hard labour, after which the ſeparation of the *Oſſa pubis* was ſenſible to the touch, according to the account of her man mid-wife *, upon the leaſt change in the ſituation of the patient's body. She felt theſe bones move,

* Mr. *Soumaine* ſurgeon, a very expert man mid-wife.

ſometimes with a kind of crackling noiſe. This continued in three ſucceſſive labours which happen'd very near each other.

But if the ſeparation of the different pieces of the *Pelvis* is not made equally in each of them, it muſt be granted that this ſeparation will be more or leſs conſiderable, according to the bulk of the child's head, and the more or leſs forcible action of the uterus, the abdominal muſcles, the diaphragm, *&c.* which propel the fœtus to the bottom of the pelvis; and laſtly, according to the diſpoſition of the cartilages and ligaments to yield to this impulſe. Hence we perceive that labours may happen where the ſuppoſed ſeparation, ſuch as that of the *Oſſa pubis*, is ſo ſmall as that it cannot be felt, while in others, this ſeparation is very ſenſible to the touch; and laſtly, that there are ſome labours in which this ſeparation is ſo conſiderable as to be ſucceeded by a total diſ-junction of the two bones, which, however, happens but rarely. Some labours have alſo occur'd in which the ſeparation of the *Oſſa pubis*, has been accompanied with that of one of the *Oſſa ilia* at its joining with the *Os ſacrum*. Two of my fellow ſurgeons § ſaw this laſt caſe in a woman of forty years of age, who died of her tenth labour.

This laſt caſe is more rare than the former, but in both the women remain lame, not being able to walk without the greateſt difficulty, as I have ſeen ſome time ago, with ſome of my fellow ſurgeons ‖, in a woman about thirty years of age, whoſe *Oſſa pubis* were ſeparated ſo far that the diviſion was eaſily perceptible to the touch.

§ Mr. *Gregoire*, ſurgeon and expert man mid-wife. Mr. *Duverney*, ſurgeon and demonſtrator of anatomy and ſurgery in the royal garden. See alſo on the ſame ſubject *Pare lib.* 24. *cap.* 13. and *Peu. lib.* 1. *cap.* 12. *p.* 183.

‖ Mr. *Soumaine* and Mr. *Arnaud* ſurgeon and demonſtrator royal.

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About a month ago Mr. *Lepinard*, one of the ſurgeons of the Hotel Dieu, upon opening a woman about thirty five years of age, who died of a laborious delivery, found the *Oſſa pubis* entirely ſeparated and divided from each other for about half a finger's breadth.

The condition of women whoſe *Oſſa pubis* have only ſuffered a ſimple ſeparation, without a diſengagement or diviſion of the ligament which unites them, is not by far ſo troubleſome as that of thoſe women in whom theſe bones are entirely ſeparated, together with a diſengagement of this ligament; ſince the former generally get quit of their misfortune by keeping their bed for ſome time, during which the cartilage which forms the union of theſe bones, in conjunction with the ligaments, *&c.* which fortify this union, ceaſing to be ſtretched, bring them again into contact by their proper ſpring and elaſticity.

To theſe examples proving the diſ-junction of the bones of the *Pelvis* in ſome labours, and alſo their entire ſeparation, which however rarely happens, we may add others, mention'd by various authors ‖, and for the moſt part diſcovered in opening the bodies of women who have died after difficult labours.

‖ See *Riolan* de anthr. *lib.* 6. *cap.* 12. *Spigelius* de hum. corp. fabr. *lib.* 2. *cap.* 24. *Pare. lib.* 24. *cap.* 13. *Guilemeau, lib.* 2. *cap.* 1. *Thom. Bartholin* de anat. *lib.* 4. *cap.* 16. *Harvey* de generat. animal. exercitat. 57. *Stalpart Vander Wiel* obſ. cent. 1. obſ. 67. *Diemerbroek* anat. *lib.* 9. *cap.* 16. *Deventer* obſ. ſur les accouch, *cap.* 3. and *Peu* Pratique des accouch, *cap.* 13.

CHAP. V.

Of the Extremities.

THE extremities of the *Skeleton* which are four in number, are diſtinguiſh'd into ſuperior and inferior.

ARTICLE I.

Of the ſuperior Extremities.

EACH ſuperior extremity is divided into the *Shoulder*, the *Arm*, the *fore Arm*, and the *Hand*. The *Shoulder* is compos'd of two pieces, one anterior, call'd the *Clavicle*, and another poſterior, call'd the *Omoplata*. The *Arm* conſiſts of one ſingle bone, call'd the *Humerus*, and the *fore Arm* of two, one of which is call'd the *Cubitus*, and the other *Radius*. The *Hand* is compos'd of the *Carpus* or *Wriſt*, the *Metacarpus* and the *Fingers*.

The *Clavicle* is a bone ſituated tranſverſely and ſomewhat obliquely in the ſuperior part of the breaſt, between the *Sternum* and the eminence of the *Omoplata*, call'd *Acromion*. This bone is long and incurvated in the form of a roman ſ placed horizontally. It is convex before next to the *Sternum*, and concave towards the *Acromion*. And behind it is concave towards the *Sternum* and convex towards the *Acromion*.

In the *Clavicle* we are to conſider its body, and its extremities. The body of the *Clavicle* is unequally round. As for its extremities, the internal, which is the thickeſt, is ſomewhat broad, and the ſurface which terminates it, is generally *triangular*: Of theſe three angles, there is only the inferior, which is the moſt conſiderable, received into the ſuperior cavity of the *Sternum*. Sometimes the two

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ſuperior angles of this ſurface are wanting. The external extremity of the *Clavicle* is ſomewhat flat, for which reaſon we diſtinguiſh two ſurfaces in it, one ſuperior, which is pretty ſmooth, and the other inferior, which is rough; and in which we find an eminence call'd the *Spine*. This extremity is terminated by a ſuperficial eminence, which correſponds to a ſmall ſurface of the *Acromion*, and both of them are cover'd with a cartilage. There is alſo, ſometimes, a third, placed between the other two. In this articulation, beſides the ſmall capſula which prevents the efflux of the ſynovia, we are alſo to conſider ſeveral ſmall ligaments which cover it. The *Clavicle* is alſo fixed to the *coracoide Apophyſis* by two ſtrong ligaments. As for the articulation of the *Clavicle* with the *Sternum*, beſides the cartilages which generally cover the eminence and the cavity, there is alſo a third ſituated between the other two; and beſides the capſula for ſecuring the *Synovia*, and ſeveral ſmall ligaments which fortify this articulation, there is a particular one which is pretty ſtrong and runs from the extremity of one *Clavicle* to adhere to the ſame part in the oppoſite one. One of the principal uſes of the *Clavicle* is to hinder the *Omoplata* and the *Arm* from hanging too much forwards.

The *Omoplata* is a very broad bone of a triangular figure, ſituated poſteriorly, at the ſuperior and lateral part of the breaſt, from about the firſt to the ſeventh true rib. In this bone we are to conſider two ſurfaces, one internal, and the other external. The internal is concave, and has many oblique lines; the external, which is a little convex, is croſſed by a pretty conſiderable eminence which is call'd the *Spine*, whoſe moſt prominent extremity is call'd the *Acromion*. Above and below the *Spine* are two *foſſæ*, call'd *ſuper-ſpinal* and *ſub-ſpinal*. In the circumference of the *Omoplata*, we find its angles, one of

which is *anterior*, and the other two poſterior. Of theſe laſt one is ſuperior and the other inferior. The edge of the *Omoplata* which is between theſe two poſterior angles, is call'd the *Baſe*, which is an *Epiphyſis* in children, and ſometimes even in adults. In this edge we are to conſider two lips, one internal, and another external. The two edges of the *Omoplata*, which reach from the poſterior angles to the anterior one, are call'd ribs, one of which is ſuperior and the other inferior. In the ſuperior, we find a groove which is cloſed up in the upper part, by a ligament; the anterior *Angle* is terminated in a cavity call'd *Glenoide*, on account of its ſhallowneſs; the figure of this cavity is nearly oval, and it is broader at its ſuperior part than any where elſe. Immediately below the *glenoide* cavity there is an eminence which ſuſtains it, and which is call'd the neck of the *Omoplata*. From the ſuperior and internal part of the neck of the *Omoplata*, there ariſes an eminence call'd *Coracoide*, which is an *Epiphyſis* in young ſubjects; it is alſo crooked on the ſide of the *glenoide* cavity: There is a *Groove* between the *Acromion*, and the neck of the *Omoplata*. The *glenoide* cavity is cover'd with a cartilage, and its edges are augmented by a kind of ligamentary capſula about two lines thick, and as many broad.

The *Omoplata* facilitates the motion of the arm, affords an inſertion for ſeveral muſcles, and ſerves as a defence to the internal parts of the breaſt which correſpond to it.

The *Arm* is form'd of one ſingle bone call'd the *Humerus*. In this bone we are to conſider its body, and its extremities; the body is not exactly round, and we may even obſerve three ſurfaces in it, namely, one internal, one external, and one poſterior. Theſe ſurfaces are ſeparated by three angles, which are much more ſenſible at the inferior extremity than at the middle of the bone of theſe

angles,

angles, one is anterior, and two upon the ſides, diſtinguiſhed into internal and external. In the ſuperior extremity of the *Humerus* there is a ſemiſpherical head, ſituated ſomewhat obliquely; and immediately below, we ſee a pretty deep line which ſurrounds it, and is called the neck of the *Humerus*. In this extremity we muſt conſider two *Tuberoſities*, which are of an unequal bulk. In the moſt conſiderable we obſerve three ſmall ſurfaces for fixing the adjacent muſcles; and in the other there is only one ſurface. Theſe two eminences are ſeparated by a *Sinuoſity*. The ſuperior extremity of the *Humerus* is an *Epiphyſis* in young ſubjects: it comprehends the *Head*, the *Neck*, a part of the *Tuberoſities*, and the beginning of the *Sinuoſity*.

In the inferior extremity, beſides the angles, we are to conſider five *Eminences* and three *Cavities*. Of the *Eminences* there are two which are diſtinguiſhed by the adherence of the muſcles, and which are called *Condyles*; they are alſo diſtinguiſhed into external and internal. Of the three others, there are two for the articulation of the *Os Cubiti*, and one for that of the *Radius*. Of the *Cavities*, there is one anterior, one *middle*, and one poſterior; which, as I ſhall afterwards ſhew, receive the eminences of the *Os Cubiti*. This extremity is an epiphyſis in young ſubjects.

The articulation of the *Humerus* with the *Omoplata* has ſomething very ſingular; for in the joining of almoſt all the bones, we find a correſpondence between the *Cavities* which receive, and the *Eminences* which are received, which is not obſervable in this; for the *Cavity* of the *Omoplata* has neither breadth nor depth enough to receive the *Head* of the *Humerus*; ſo that it only ſerves as a ſupport to it during its motions, which are performed, not only upwards and downwards, backwards and forwards, but alſo in a circular manner, as well round its axis, or in the

the manner of a pivot, as in turning in the gyratory direction of a ſling, and all theſe motions are ſo much the more free, in proportion as the *Head* of the *Humerus* is not confined by the bony edges of the cavity; the parts of this eminence, which do not touch the cavity, being only embraced by a membranous ligament, which on one ſide is fixed to the edge of this *Cavity*, and on the other to the neck of the *Humerus*. But to prevent the frequent diſlocations of the arm, to which a ſimilar diſpoſition of this joint would have expoſed it, it happens, 1ſt, that the ligament which I have ſaid embraces the head of the *Humerus* is covered in the greateſt part of its extents by the *Aponeurotic* tendons of the adjacent muſcles, which are even cloſely fixed to it. 2d, that this ligament is thickeſt in the parts where it is not fortified by the muſcles, and thineſt in thoſe where it is covered. It is alſo to be obſerved, that in the neighbourhood of this articulation we find the *Coracoide Apophyſes* and the *Acromion*, which by their particular figure, and the ſtrong ligaments which they reciprocally ſend to each other, furniſh a ſtrong and ſolid rampart, which prevents the diſlocation of the head of the *Humerus*, by forming a kind of arch, under which this head is concealed in moſt of its motions.

The *Fore Arm* is compoſed of two bones, called the *Cubitus* and the *Radius*. It is obſervable, that the *Cubitus* is ſomewhat longer than the *Radius*, and a great deal larger at its ſuperior than at its inferior part. But the contrary happens in the *Radius*, which is bigger in its inferior than in its ſuperior part.

In the *Cubitus* we are to conſider its body and its extremities. Its body is of a triangular figure, and we diſcover three ſurfaces in it; one internal, one external, and another poſterior. In its ſuperior extremity we find three eminences and three cavities: the eminences are called the *Coronoide*, the *Olecranum*, and the *middle Apophyſis*. The *Coronoide* is received,

ceived, during the flexion of the *fore Arm*, into the anterior cavity of the *Humerus*. The *Olecranum*, during its extenſion, is received into the poſterior cavity of that bone, and is an *Epiphyſis* in young ſubjects: the middle *Apophyſis* is received into the cavity which correſponds to it. As for the *Cavities* there are two, which are called *Semilunar*, and a third called *Sigmoide*. The *Semilunar* receive two eminences of the *Humerus*, and the *Sigmoide* receives the ſuperior and lateral internal part of the *Radius*. In the inferior extremity of the cubitus, there are two eminences and two cavities: one of the eminences is received by the *Radius*, and the other, called *Styloide*, affords an adheſion to the ligaments. As for the cavities, one of them correſponds to the *Carpus*, and the other is a ſinuoſity.

In the *Radius*, as well as in the *Cubitus*, we are to conſider its body and its two extremities. In its body we find three *Surfaces*, and a creſt which correſponds to that of the *Cubitus*. Theſe ſurfaces are diſtinguiſhed into *anterior*, *internal*, and *external*. In its ſuperior extremity we obſerve a *glenoide* cavity, which receives an eminence of the *Humerus* and a neck; and in its internal lateral part we find a ſuperficial eminence, which is received into the *Sigmoide* cavity of the *Humerus*, and a tuberoſity. As for its inferior extremity, we perceive in its anterior part a pretty ſharp eminence, and ſome cavities, the moſt conſiderable of which is deſtin'd for the articulation of the *Carpus*. The poſterior receives one of the two eminences of the *Cubitus*, and the reſt are only *Sinuoſities*.

The *Cubitus* and the *Radius* are joined with each other by three ligaments. The ſuperior, which is very ſtrong, embraces the neck of the *Radius*, and terminates in the *Cubitus*: the inferior extends from the edge of the poſterior cavity of the *Radius*, to the *Cubitus*. The third, called *Interoſſeus*, adheres all along

along theſe bones to the ſharp eminences called the *Creſts*. Theſe bones are articulated with each other, as well in their ſuperior as in their inferior parts, by a *Ginglymus* with two heads. By means of this articulation, the *fore Arm* has two particular motions, known by the name of *Pronation* and *Supination*. In the *Pronation* the palm of the hand is turned undermoſt, and the *Radius* croſſes the *Cubitus*; and in the *Supination*, which is the oppoſite motion, theſe bones are parallel to each other.

The two bones of the *fore Arm* are joined to the *Humerus* in a different manner; the *Cubitus* is joined to it by the moſt perfect *Ginglymus* which is to be found in the whole body; and it is by this articulation that the *Cubitus* can move in two directions upon the *Humerus*, like a lever upon its fulcrum, deſcribing a portion of a circle. The *Radius* is joined to the *Humerus* by the ball and ſocket, and it is this articulation which gives it the liberty not only of following the motions of the *Cubitus*, but alſo of performing upon the *Humerus* the ſeveral motions of *Semi-rotation*, whenever it executes thoſe of *Pronation* and *Supination*.

It has been long imagined, and ſome even at preſent think, that *Pronation* and *Supination* are motions peculiar to the *Radius*; and that while theſe motions are performed, the *Cubitus* remains immovable. The juſtly celebrated Mr. *Winſlow* has ſhewn, that except in two conſtrained motions of the *fore Arm*, in which the *Cubitus* remains as it were immovable, in all the reſt, not only the *Cubitus* and *Radius* move in *Pronation* and *Supination*, but alſo that the *Humerus* moves at the ſame time*.

The ligaments which fix the *Cubitus* and *Radius* to the *Humerus* are three in number: the firſt, or

* See the memoirs of the royal academy of ſciences for the year 1719.

moſt

moſt interior, is called the *orbicular*, which is properly no more than the membrane or capſula, which prevents the diſcharge of the *Synovia*; and this membrane is fortified by ſeveral ligamentary fibres, which cover it by croſſing each other in various directions: This capſula adheres to the lips of the eminences and cavities which form the articulation. The other ligaments are ſituated on the ſides, for which reaſon they are called lateral: they are pretty narrow, but very ſtrong. In one part they are fixed to the condyles of the *Humerus*, and another to the ſuperior part of the *Cubitus*. That which comes from the external condyle, covers in its paſſage the ſuperior part of the *Radius*, and by that means fortifies the membranous ligament which fixes that bone to the *Humerus:* it alſo ſtrengthens that which I have ſaid fixes the *Radius* to the *Cubitus* in its *ginglymoide* articulation.

The *Hand* is compoſed of the *Carpus* or *Wriſt*, the *Metacarpus*, and the *Fingers*. The *Carpus* conſiſts of eight bones diſpoſed in two rows. In the firſt, or that next the fore arm, there are only three, the fourth being out of the row: the ſecond row is compoſed of four, and theſe two rows form a convexity externally, and a concavity internally. *Lyſerus** has given a particular name to each of theſe bones; for he has called the moſt anterior of the firſt *Scaphoide*, the ſecond *Lunary*, and the third *Cuneiform*; as for the fourth, which is out of the row, he has called it *Piſiform:* that of the ſecond row, which is joined to the thumb, is by him called *Trapezio*, the next *Trapezoide*, or *Pyramidal*, the third the *Great*, and the fourth *Hooked*. The *Scaphoide* is convex in its ſuperior, and concave in its inferior part. It receives into its cavity a part of the bone called the *Great Bone:* the *Scaphoide*. in its

* Culter Anatom, Lib. 5. Cap. 2.

internal

internal and inferior part, has an *Apophyſis* which joins with the bones called *Trapezio* and *Pyramidal:* the *Lunary* has a convexity which is received by the *Radius*, and a cavity which receives the greateſt part of the head of the bone called the *Great Bone*. The *Cuneiform* has three ſurfaces, by which it touches the *Lunary*, the *Crooked*, and the *Piſiform*. The *Piſiform* bone, by ſome called *Lentiform*, is irregularly round, except in one ſurface, which is ſmooth and gently concave, and by which it is joined to the *Cuneiform*. The *Trapezio* has ſeveral ſurfaces, one external, one internal, one ſuperior, one inferior, and two poſterior. The external has nothing particular, but in the internal, we find an eminence and a cavity; by its ſuperior ſurface it touches on the *Scaphoide*; by its inferior, which is divided into two ſmall ſemicircular ſurfaces, it is joined to the thumb, and by its two poſterior ſurfaces it touches the *Pyramidal*, and the firſt bone of the *Metacarpus*. The Pyramidal has alſo ſeveral ſurfaces; for beſides its external, which is the largeſt, it has four others, by which it is joined to the *Scaphoide*, the *Trapezio*, the *Great Bone*, and the firſt of the *Metacarpus*. The *Great Bone* has in its ſuperior part a round head, which is received into a cavity formed by the union of the *Scaphoide* with the *Lunary*. It has alſo three ſurfaces, by which it is joined to the *Pyramidal*, the *Crooked*, and the ſecond of the *Metatarſus*. The *Crooked* has three ſurfaces, one *anterior*, one *poſterior*, and the third *inferior:* by the *anterior* it is joined to the *Great Bone*, by the *poſterior* to the *Cuneiform*, and by the *inferior*, which is divided into two by a prominent line, it is joined to the two laſt of the *Metacarpus*. In the internal ſurface of this bone, we alſo obſerve an *Apophyſis*, which is incurvated from behind forwards, and which is oppoſite to the *Trapezio*.

The *Metacarpus* is compos'd of four bones, which are irregularly triangular in their length, and ſomewhat incurvated externally. In theſe bones, we are to conſider their bodies, and their extremities; the body has three ſurfaces, one *external* and two *internal.* At their ſuperior extremities, we find flat, and pretty ſmooth ſurfaces, which ſerve for their articulation, with the bones of the *Carpus.* Their inferior extremity, which is an epiphyſis in children, is round like a head for their articulation with the fingers: The two firſt bones of the metacarpus are of an equal length, and the third, tho' ſhorter than the former two, is yet longer than the fourth. The bones of the metacarpus touch each other at their extremities, and thro' the reſt of their extent leave interſtices, which are fill'd up by the muſcles.

The five fingers conſtitute the third part of the hand, and are each compos'd of three pieces call'd phalanges. The firſt of the thumb, in its ſtructure nearly reſembles that of the bones of the *Metacarpus,* tho' it is a little larger, flatter and ſhorter. In its ſuperior part it has a ſurface ſomewhat flat in its middle, and gently concave at its lips both external and internal, the better to accommodate itſelf to the figure of the bone call'd *Trapezio,* which correſponds to it. The inferior extremity of this *Phalanx* has a head for its *arthroidal articulation* with the ſecond, which in its ſuperior part has a cavity; and in its inferior, two eminences and a cavity for its *ginglymoide* articulation with the third *Phalanx.* This laſt is ſhorter and ſmaller than the two others. Its inferior extremity is very narrow and even unequal, eſpecially on its internal ſurface.

The four following fingers are not of the ſame length as every one may eaſily perceive. They are all ſituated in the ſame line, and in a direction almoſt oppoſite to the thumb. Thus their flexion is perform'd, from without inwards, whereas that of the

the thumb, is from before backwards. Theſe four fingers are each compos'd of four *Phalanges*, the firſt of which is larger than the ſecond, and the ſecond longer than the third. Their external ſurface is ſomewhat convex, and their internal a little concave.

The firſt *Phalanx* has in its ſuperior part a cavity for its *arthroidal* articulation with the bones of the *Metacarpus*. In its inferior part it has two eminences and a cavity, for its *ginglymoide* articulation with the ſecond *Phalanx*, and the ſame holds true of the ſecond with reſpect to the third.

In young ſubjects, each bone has an *Epiphyſis* in its inferior part. The ſame thing is found in the firſt *Phalanx* of the thumb, but the contrary is obſerved in its two other *Phalanges*, and in all thoſe of the other four fingers, are *Epiphyſes* in their ſuperior, and not in the inferior parts.

The three bones of the firſt row of the *Carpus* are united with each other, and by their union a round eminence is form'd, which is received into the inferior cavity of the *Radius*, which is augmented by an elongation of the cartilage which covers its ſurface, and advances to the ſurface of the *Cubitus*, where it is ſecur'd by two ligaments, one of which fixes it to the *Os Cuneiforme*, and the other to the *ſtyloide Apophyſes* of the *Cubitus*, ſo that the *Cubitus* can move on the ſurface of that middle cartilage. By this means we perceive, that this bone does not contribute to the formation of the cavity which receives the firſt row of the carpus. It is even obſervable, that the third bone of this row, has but a ſmall ſhare in the formation of the head which is received into this cavity, that eminence being almoſt entirely form'd, by the two firſt bones, call'd *Scaphoide* and *Lunary*.

The joining of the *Carpus* with the *fore Arm* is a true *Arthrodia*, ſince it permits the hand to make

motions in all directions, except that of a direct rotation, or according to the axis or length of the *fore Arm.*

It is to be obſerved, that not only the bones of the carpus are join'd with each other, but alſo that the ſecond row is united with the bones of the *Metacarpus*; and laſtly, that the firſt bone of this row is articulated with the firſt phalanx of the thumb.

The joining of the bones of the carpus with each other, permits them to move by ſlipping a little over each other; but this motion is not equally manifeſt in all theſe bones; for we obſerve, that the joining of the firſt row with the ſecond permits as free a motion in various directions, as that of the firſt row with the *fore Arm.* which is not obſervable in the joining of the bones of the ſecond row with thoſe of the *Metacarpus*, tho' the ſurfaces on which all theſe bones touch each other, are cover'd with a ſmooth and even cartilage. 'Tis however to be obſerved, that the laſt bone of the *Metacarpus* has a very ſenſible motion at its joining with that bone of the *Carpus* which correſponds to it.

As for the articulation of that bone of the *Carpus*, call'd *Trapezia*, with the thumb, it has ſomething very ſingular in it; for it partakes both of the *Ball* and *Socket* and the *Groove*; which gives this finger a liberty of moving in ſeveral directions; and in its ſeveral motions it has the ſame ſteadineſs as if its articulation was a true *Groove.*

The firſt *Phalanges* of the four laſt fingers are by the *Ball* and *Socket* join'd with the bones of the *Metacarpus* by a *Groove* with the ſecond *Phalanges*, and theſe with the third in the ſame manner.

If we advert to the particular diſpoſition of the bones of the *Carpus*, and their connexion with thoſe of the *fore Arm*, we will eaſily perceive, that the hand in its natural ſituation, is not in the ſame longitudinal direction with the bones of the fore Arm;

but on the contrary, that it ſtands obliquely backwards; ſo that in this natural ſituation of the hand, the fingers being extended and a little ſeparated, the extremity of the *fore Finger* correſponds to the interſtice of the bones of the *fore Arm*, as Mr. *Winſlow* has very juſtly obſerved.

Before we deſcribe the ligaments of theſe different articulations, it is proper to ſay ſomething of that call'd the *Annular*, becauſe ſome have thought that it every where embraced the wriſt. But it has been found that inſtead of one ligament there are two, which are called the *annular* ligaments, and are diſtinguiſhed into internal and external; the internal *annular* ligament is fixed to the *Trapezia* which ſupports the thumb, and afterwards paſſing from the anterior to the poſterior part, terminates at the *uneiform* or *crooked* and the piſiform bone. This ligament leaves a pretty conſiderable vacuity for the paſſage of the tendons of the flexor muſcles of the fingers. The external *annular* ligament is fixed very cloſe at one of its extremities to the *piſiform* bone; then it runs obliquely from below upwards, and terminates in the external ſurface of the *Radius*, advancing to the ſharp eminence of that bone. This ligament is not fixed, except to certain parts of the ſurfaces of the bones which it runs over; and by this means it leaves free ſpaces for the paſſage of the tendons of the extenſor muſcles of the fingers and wriſt.

The ligaments of the articulation of the *Carpus* with the *fore Arm* may be diſtinguiſhed into thoſe obſervable in the internal ſurface of the *Carpus*, and thoſe which we perceive in its external *Surface*. I ſhall here ſay but little of the capſulary membrane, which prevents the effuſion of the *Synovia*, ſince it is not different from that obſervable in all the other moveable articulations. It is fixed at one part to the edge of the cavity, and at the other to the circumference of the head. The firſt of the ligaments obſervable

obſervable in the internal ſurface of the *Carpus*, begins at the ſharp eminence which is ſituated anteriorly at the inferior part of the *Radius*, and terminates at the *Scaphoide* bone: the ſecond is a pretty broad ligament, which is fixed to the interior edge of the cavity of the *Radius*, and is afterwards as it were confounded with ſeveral other ligaments which cover the whole internal ſurface of the *Carpus:* theſe laſt, whoſe fibres croſs each other in various directions, ſeem to derive their origin from the four bones of the firſt row; they adhere to all thoſe of the ſecond, and advance to the ſuperior part of the bones of the *Metacarpus*, where they terminate. Beſides theſe ligaments we alſo find other ſmall tranſverſe ones in the internal ſurface of the *Metacarpus*, which fix theſe bones to each other, as well by their ſuperior as by their inferior parts.

As for the ligaments in the internal ſurface of the wriſt, they may be divided into three claſſes: in the firſt are comprehended thoſe which ſtrengthen the articulation of the *Carpus* with the *fore Arm*, and which are three in number: the firſt is pretty broad, fixed in one place to the inferior and external part of the *Radius*, and in the other to the *Os Cuneiforme:* the other two fix the *Styloide apophyſis* of the *Cubitus* to the ſame *Os Cuneiforme*. The ligaments of the ſecond claſs ſecure the articulation of the firſt, with the ſecond row of the *Carpus*. There are two of theſe ligaments, one ariſing from the inferior part of the *Scaphoide*, and the ſecond from the *Os Cuneiforme:* at laſt theſe two ligaments are united, and terminate at the *Os Unciforme*. 'Tis to be obſerv'd, that at the joining of the firſt row with the ſecond, the capſulary membrane which prevents the effuſion of the *Synovia*, diſcovers itſelf plainly immediately below the advanced or jutting part of the *Scaphoide*, where this membrane appears pretty looſe. As for the ligaments of the third claſs, which ſtrengthen the join-

ing of the bones of the *Carpus* with each other, and that which they have with the bones of the *Metacarpus*, they are very ſhort, and only reach from one to another.

The bones of the *Carpus* are cover'd by cartilages and ligaments, which adhere ſo ſtrongly to them that they ſerve as a *perioſteum*, of which they ſeem to be deſtitute.

As for the ligaments of the fingers, they are different in proportion to the diverſity of their articulations; for thoſe obſerved in the joining of the firſt Phalanx of the thumb, as well with the bone of the *Carpus* which correſponds to it, as with the ſecond *Phalanx*, are orbicular as well as in all the articulations by the *Ball* and *Socket*. There are ſimilar ligaments in the joining of the firſt *Phalanx* of the four laſt fingers, with the bones of the *Metacarpus*. The ligaments of the other articulations of the fingers, and of that of the ſecond *Phalanx* of the thumb with the third, are *lateral*; that is to ſay, they are placed on each ſide of the joint, immediately on the capſular membrane. The ligaments of theſe different articulations are fortified by the tendons of the adjacent muſcles, eſpecially of the extenſors and flexors of the muſcles of the fingers; to which we may add thoſe of the *interoſſeous Muſcles*, which ſtrengthen the articulation of the firſt *Phalanx* of the four laſt fingers. In deſcribing the *ſeſamoide* bones found in the foot, I ſhall give ſome account of thoſe to be met with in the hand.

ARTICLE II.

Of the inferior Extremities.

EACH inferior extremity is divided into the *Thigh*, the *Leg*, and the *Foot*. The *Thigh* conſiſts of one ſingle bone, called the *Femur*. The *Leg* is compoſed of two, called the *Tibia* and *Fibula*.

Anteriorly

Anteriorly at the joining of the *Thigh* with the *Leg*, there is alſo another bone, called the *Rotula*. The *Foot*, as well as the *Hand*, is divided into three parts, namely, the *Tarſus*, *Metatarſus*, and *Toes*.

The *Femur* is longer than any other bone in the ſkeleton, and in it we are to conſider the body and the extremities. Its body is ſomewhat incurvated forwards, eſpecially about the middle. Along the poſterior or concave part of this bone, we obſerve a kind of *Creſt*, commonly called the *Oſſeous Line*, which in its ſuperior and inferior parts is divided into two branches, which go off to the eminences called *Trochanters* and Condyles, which I ſhall afterwards deſcribe. In the body of the *Femur* there are three ſurfaces; one anterior, which is ſomewhat round, and two poſterior, called internal and external, which are flat: about the middle of the internal ſurface of this bone, we generally find the orifice of a canal, which penetrates about an inch into the ſubſtance of the bone, and terminates in the medullary duct. The direction of this canal is from below upwards, and permits the paſſage of an artery, a nerve, and a vein, which are diſtributed thro' the marrow.

At the ſuperior part of this bone we obſerve ſome *Eminences* and *Cavities:* the *Eminences* are four in number, namely, the head of the *Femur*, which is an *Epiphyſis* in young ſubjects, and ſometimes alſo in adults. It is ſupported by a ſecond eminence, called the neck of the *Femur:* this eminence is ſituated obliquely from below upwards, and from without inwards, inclining a little forwards. The direction of the neck of the *Femur* correſponds to that of the *Cotyloide* cavity, which is alſo ſituated obliquely. The third and fourth eminences in the ſuperior part of the *Femur* are called *Trochanters*, which in young ſubjects are *Epiphyſes*, and from their bulk they are divided into large and ſmall. The great *Trochanter* is ſituated in the external part,

and terminates poſteriorly in a blunt point. The ſmall *Trochanter* is ſituated in the internal part, a little below the great one. Theſe two eminences are poſteriorly united with each other by a kind of creſt. As for the cavities, there are only two of them, one of which is in the head of the *Femur*, and the other between the great *Trochanter* and the neck of the *Femur*. At the inferior part of this bone there are four *Eminences*, two of which are only called *Condyles*. They protuberate pretty much backwards; and 'tis obſervable, that the internal deſcends a little lower than the external: this laſt is generally broader, and inclines more forwards than the other. The two other *Eminences* are placed forwards, and are only continuations of the former. That which correſponds to the external condyle is larger, and advances a little higher than the other. In the ſame extremity we alſo find two cavities, the moſt conſiderable of which is placed poſteriorly between the two condyles, and the ſmalleſt divides the eminences which are in the anterior part.

The *Rotula*, which is a bone ſituated at the anterior and inferior part of the *Femur*, is unequally round and flat. We find two ſurfaces in it, one anterior and the other poſterior: the anterior is ſomewhat convex and rough, and the poſterior has two cavities, ſeparated by an eminence. The external cavity is deeper than the other, and both of them correſpond to two eminences, and to the cavity of the anterior and inferior part of the *Femur*. At its ſuperior part there is a ſlight depreſſion, in which are fixed a large number of tendinous fibres, which come from the extenſor muſcles of the leg. The reſt of this ſurface is cover'd by ſome of the ſame fibres which adhere ſo ſtrongly to it that they ſeem to ſerve as a *Perioſteum* for it. At the inferior part of the ſame ſurface there are ſome inequalities for fixing

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a very ſtrong ligament, which joins the *Rotula* to the anterior eminence of the *Tibia*, called the *Tuberoſity*.

The Tibia is larger than any bone in the ſkeleton, except the *Femur:* In it we are to conſider the body and the extremities. Its body is triangular in its length, and we diſtinguiſh in it three ſurfaces; one internal, which is flat; one external, which is a little depreſs'd; and a third poſterior, which is round. The anterior angle is called the *Creſt*, and the external the *bony Line*. Laſtly, about four fingers breadth from its ſuperior part, we find the orifice of a canal which penetrates into, and terminates in the medullary duct: this canal affords a paſſage for a nerve, an artery, and a vein, which are diſtributed thro' the marrow.

The ſuperior part of the Tibia is much larger than the inferior. We are to conſider two cavities in it, which are almoſt of an oval figure, and are but ſhallow, tho' the internal is deeper than the external. Theſe two cavities are ſeparated by two eminences: and laſtly, we obſerve a kind of *Sinuoſity*. In the anterior part is ſituated an eminence call'd a Tuberoſity, which is an *Epiphyſis* in children; and in the external ſurface of this extremity we find a ſuperficial eminence for the articulation of the *Tibia* with the *Fibula*.

At the inferior extremity of the *Tibia* we are to conſider an *Apophyſis*, which ſeems to be an elongagation of its internal ſurface, and is called *Malleolus Internus*. In the ſame extremity we alſo find three cavities, of which the one in its external ſurface receives the *Fibula*; the two others are deſtin'd for the articulation of the leg with the foot, and are ſeparated by a ſuperficial eminence; and laſtly, we find a *Sinuoſity* behind the *Malleolus internus*.

The *Fibula* is a bone as long as the *Tibia*, but very ſmall, and unequally triangular in its length: in it we diſtinguiſh three ſurfaces; the *internal* and ex-

ternal are a little convex, and the poſterior, which is pretty ſmooth, is moſt generally convex and round: in this bone we alſo find an oſſeous line. In its ſuperior extremity we are to conſider a ſhallow cavity, which correſponds to the eminence placed at the ſuperior and external part of the *Tibia*. The inferior extremity of the Fibula forms the *Malleolus externus*, and we find in its internal ſurface a ſuperficial eminence, and laſtly a *Sinuoſity*.

The foot is divided into *Tarſus*, *Metatarſus*, and *Toes*: the *Tarſus* is compoſed of ſeven bones, *viz.* the *Aſtragalus*, the *Calcaneum*, the *Scaphoide* or *Navicular*, the *Cuboide*, and the three *Cuneiformia*. The *Metatarſus* is compoſed of five, and the *Toes* of fourteen called the *Phalanges*.

The firſt or uppermoſt of the bones of the *Tarſus* is called *Aſtragalus*, in which we are to conſider its body, and in its anterior part a round eminence, which is received by the *Scaphoide* bone. The ſuperior part of its body is ſurrounded by two eminences, between which there is a ſuperficial depreſſion for its *ginglymoide* articulation with the *Tibia*. In its anterior part we obſerve a cavity, in form of a creſcent, for its articulation with the *Calcaneum*. In this part we alſo find a ſmall ſurface, by which the *Aſtragalus* is joined with the ſame bone. Its lateral external part has a cavity which receives the *Fibula*: the internal has alſo one much ſmaller, which correſponds to an eminence of the *Tibia*, called *Malleolus internus*. The aſperities found below this ſmall cavity afford an adheſion to the ligaments: in the poſterior and ſomewhat internal part of the *Aſtragalus* we perceive a *Sinuoſity*. Laſtly, we obſerve that its anterior eminence, in conjunction with its body on the external ſide, forms a groove which correſponds to a ſimilar one of the *Calcaneum*.

The largeſt and moſt poſterior bone of the *Tarſus* is the *Calcaneum* or heel bone, in which we may diſtin-

guiſh four parts, one *anterior*, one *poſterior*, one *ſuperior*, and one *inferior*; as alſo two ſurfaces, one *external*, and another *internal*. The anterior part is terminated by a ſuperficial cavity which receives the *Cuboide*, and the poſterior has a conſiderable tuberoſity, which is an *Epiphyſis* in children. At the ſuperior part we find a pretty conſiderable eminence and a ſmall ſurface, which join to the *Aſtragalus*: in the inferior part we find aſperities, which facilitate the adheſion of the ligaments and muſcles: and in the external ſurface, we obſerve a ſmall *Tuberoſity* and a *Sinuoſity*. 'Tis on the ſide of the external ſurface, that the *Calcaneum* forms in its ſuperior part a groove, which correſponds to that of the *Aſtragalus*. The internal ſurface of this bone is hollow'd obliquely, and we find a *Sinuoſity* in its ſuperior part.

The *Scaphoide* or *Navicular* is ſituated between the two *Oſſa Cuneiformia* and the *Aſtragalus*: this bone has in its anterior part three ſmall ſurfaces, or ſuperficial eminences, for its articulation with the *Oſſa Cuneiformia*; and in its poſterior part we find a pretty conſiderable cavity, which receives the anterior eminence of the *Aſtragalus*: its ſuperior part is a little convex and rough, and the inferior a little concave and unequal. In this laſt we obſerve a ſmall *Tuberoſity* and a *Sinuoſity*.

The *Cuboide* is ſituated between the two laſt bones of the *Metatarſus* and the *Calcaneum*. It has ſix ſurfaces, the firſt or *ſuperior* of which is unequal; the ſecond and third are found at the inferior part of this bone, and are divided by an oblique eminence, before which there is a *Sinuoſity*. The fourth ſurface is anterior, and correſponds to the two laſt bones of the *Metatarſus*, with which it is joined. The fifth and poſterior is joined with the anterior part of the *Calcaneum*: and the ſixth, which is internal, is join'd to the third *Cuneiform* bone.

The

The three *Cuneiform* bones are ſituated between the three firſt bones of the *Metatarſus*, the *Cuboide*, and the *Scaphoide*. Their bulk is not the ſame in all; for the firſt or moſt internal is largeſt, the third is larger than the ſecond, but leſs than the firſt.

In each of theſe bones we are to conſider five ſurfaces, as in a wedge; and their ſituation is ſuch, that the ſecond and third of theſe bones have their points turned towards the ſoles of the feet; and the firſt, on the contrary, has its point turned towards the upper part of the foot. Theſe bones are by their anterior ſurface joined to the three firſt bones of the *Metatarſus*, and by their poſterior to the *Scaphoide* bone. We obſerve that the third *Cuneiform* is alſo joined to the *Cuboide* by its external ſurface.

The five bones of the *Metatarſus* are irregularly triangular in their length, and ſomewhat incurvated upwards. Their anterior extremity forms a round head, which correſponds to the cavity of the firſt *Phalanges* of the toes. The poſterior extremity of theſe five pieces terminates in a flat ſurface, as well as the three *cuneiform* bones and the *Cuboide* with which they are joined. Upon the lateral parts of this extremity, there are alſo ſome ſmall ſurfaces for the joining of the bones between them. Theſe bones are broader behind than before, and we even obſerve in the four firſt, that their poſterior extremity has more extent towards the ſuperior than the inferior part of the foot. As for the fifth piece, its poſterior extremity retains the ſame breadth above and below the foot: it is even augmented by an *Apophyſis* which it produces, and which runs beyond the *Cuboide* with which this piece is joined.

The firſt piece which ſuſtains the thumb is ſhorter than the reſt, but its bulk is much more conſiderable; and in its anterior and inferior parts it has two ſmall cavities, ſeparated by an eminence: theſe cavities receive two *ſeſamoide* bones. The four other pieces

pieces are nearly of the ſame length, except that which correſponds to the ſecond toe, which is longer than all the reſt.

Each toe is compoſed of three pieces, called *Phalanges*, except the thumb, which has only two: All theſe pieces are diſpoſed nearly in the ſame manner as in the hand, with this difference, that the *Phalanges* of the foot are ſhorter, and for the moſt part ſmaller than thoſe of the hand.

After having treated of the different bones which compoſe the inferior extremity, we now proceed to enquire into their articulations. The firſt of theſe bones, which is the *Femur*, is joined with the *Os innominatum* by *Enarthrosis*, or the ball and ſocket. This articulation permits the thigh to move in different manners, namely, backwards and forwards, internally and externally, as I ſhall ſhew in treating of the muſcles of this part.

The particular diſpoſition of this articulation, as well on the ſide of the cavity of the *Os innominatum*, as on that of the *Head* of the *Femur* and its neck, is very advantageous for the two principal uſes of this bone, the firſt of which is to ſuſtain the weight of the body, whether in an upright poſture or on the knees, and the ſecond to tranſport the body from one place to another. To anſwer the firſt of theſe uſes, the *Cotyloide* cavity is deeper above and before, than below and before, ſince 'tis principally in the ſuperior and poſterior part of this cavity that the head of the *Femur* is ſecured, whether the body is in an upright poſition or on its knees; and it is by the ſhallowneſs of this cavity in its anterior and inferior part, and by its obliquity joined to that of the *Head* of the *Femur* and its neck, as is juſtly obſerv'd by a very ſkilful anatomiſt, that the motions of flexion and adduction in the thigh are rendered more eaſy and unconfined. Theſe are the external and internal motions, which are not only the moſt

frequent, but alſo the principal for tranſporting the body from one place to another.

The *Condyles* of the *Femur* are in their anterior and poſterior parts, covered with a ſmooth and even cartilage: this ſame cartilage covers the eminences which correſpond to the *Rotula*, and the cavity which divides them. The ſuperior ſurfaces of the *Tibia*, which correſpond to the two condyles of the *Femur*, are covered with a ſimilar cartilage; and the *Synovia*, which maintains the flexibility of all theſe cartilages, ſeems to be ſupplied, not only by the *mucilaginous Glands*, but alſo by the pinguous maſſes which are found there. The capſular membrane, which prevents the efflux of this liquor, is fixed not only to the circumference of the *Condyles*, and the edges of the ſuperior ſurfaces or cavities of the *Tibia*, but alſo to the circumference of the rotula; ſo that its internal ſurface, which is alſo covered with a cartilage, ſerves as a capſular membrane to retain the *Synovia*.

At the articulation of the *Tibia* with the *Femur* we find two middle cartilages, which are called *Semilunar*, becauſe their figure reſembles that of a creſcent. They lie on the ſuperficial cavities of the *Tibia*; their convex part, which is thickeſt, correſponding to the edges of theſe cavities; and their concave part, which is very ſlender, facing the middle of each; ſo that the extremities of one of theſe cartilages are turned towards thoſe of the other, and the middle of theſe cavities, which is about a third of each, is left uncovered. Theſe two cartilages terminate by very ſhort and ſtrong ligaments, in certain inequalities in form of tubercles, which are found between the ſuperior ſurfaces of the *Tibia*, and by ſome portions communicate with the croſs ligaments.

The convex part of theſe cartilages is fixed, not only to the capſula of the joint, but alſo to the *lateral*

lateral Ligaments. Their inferior ſurface, which touches the *Tibia*, is flat, and its ſuperior is a little concave, in order to form in conjunction with the *Tibia*, two cavities which correſpond to the *Condyles* of the *Femur*.

The ligaments of this articulation are very ſtrong and pretty thick: with reſpect to their ſituation they may be diſtinguiſhed into *internal* and *external:* theſe laſt lie over the Capſula, and the others are cover'd by it. The external are three in number, namely, one *anterior*, and two *laterals.* The firſt fixes the *Rotula* to the eminence of the *Tibia*, called its *Tuberoſity:* the fibres of the extenſor muſcles of the leg, which, as I have ſaid, paſs over the *Rotula*, loſe themſelves in this ligament. The other two ligaments riſe from the external and almoſt poſterior ſurface of each *Condyle*, and terminate in different parts; namely, the ligament which comes from the *internal Condyle*, terminates about four fingers breadth below the articulation, at the ſuperior and internal part of the *Tibia*, advancing towards its anterior part. From the ſuperior part of this ligament there ariſe many fibres, which terminate poſteriorly in the ſuperior part of the *Tibia.* The ligament which comes from the external *Condyle* is divided into two portions, the leaſt conſiderable of which terminates in the ſuperior part of the *Fibula*, and the other runs obliquely backwards, paſſing over the articulation of this bone, and terminates in the poſterior part of the *Tibia*, about two fingers breadth from its articulation with the *Femur.* Beſides theſe ligaments, there are alſo poſteriorly ſeveral ligamentary fibres, which run from the *Femur*, and are fixed to the ſuperior part of the *Tibia.* As for the *internal*, called alſo *croſs* ligaments, there are two of them, which from their ſituation may be diſtinguiſhed into *anterior* and *poſterior:* the former ariſes from the inequalities which anteriorly divide the two cavities of the

Tibia,

Tibia, and running obliquely from within outwards, reaches to the cavity in form of a groove, which divides the *Condyles*, in order to terminate in the external *Condyle*. The ſecond, or poſterior, riſes from the upper part of the *Tibia* at the beginning of a kind of *Sinuoſity*, which, as I have ſaid, is found there: it advances to the eminences which divide the two cavities of that bone, to which eminences this ligament as well as the preceding is fixed, and then running a little obliquely from without inwards, it terminates in the internal *Condyle*.

The articulation of the *Tibia* with the *Femur*, permits the leg to make the motions of flexion and extenſion. It can alſo move ſemicircularly, inwards and outwards; but for this purpoſe it muſt be half bended, or make a right angle with the thigh: for if when the leg is extended and makes as it were but one piece with the thigh, we turn the foot ſemicircularly inwards and outwards; theſe motions by no means depend on the articulation of the *Tibia* with the *Femur*, but rather on the articulation of this laſt with the *Os innominatum*. As for the *Rotula*, it moves upwards and downwards; that is to ſay, it follows the leg in the motions of flexion and extenſion, and not in thoſe which it performs ſemicircularly, on account of its *ginglymoide* articulation.

A celebrated anatomiſt conſiders the *Rotula*, with reſpect to the *Tibia*, as the *Olecranon* with reſpect to the *Cubitus*: he thinks that theſe two eminences anſwer the ſame uſes with reſpect to the extenſor muſcles of the *fore Arm* and thoſe of the leg, that is to ſay, they augment their ſtrength, and guard them againſt the compreſſion to which they would have been ſubject without their aſſiſtance. 'Tis alſo to be obſerved, that the *Olecranon* ſerves to ſtrengthen the articulation of the *Cubitus* with the *Humerus*; for 'tis ſufficiently certain that this eminence of the *Cubitus* hinders the *fore Arm* from bending backwards, whereas

whereas the leg is only hindered from bending forwards by the particular ſituation of its *lateral Ligaments*. 'Tis alſo for theſe different uſes that the *Olecranon* makes but one ſingle piece with the *Os Cubiti*, and that the *Rotula* on the contrary is detached from the *Tibia*, or at leaſt is only joined to it by a flexible ligament, which proves no obſtacle to the ſemicircular motions which the leg performs when half bent, and of which it would have been incapable, if the *Rotula* and *Tibia* had not formed but one piece in conjunction.

The ſuperficial eminence found at the lateral external part of the *Tibia*, is received into the cavity of the *Fibula*. Beſides the cartilages which cover the ſurface of theſe two bones, and the capſulary membrane which prevents the effuſion of the *Synovia*, we find ſeveral ligaments fixed round this articulation; they are pretty ſtrong, tho' ſhort. We may reckon five of them, namely, two *anterior*, two *poſterior*, and one *ſuperior*. All theſe ligaments are joined with each other, and as it were glewed to the capſulary membrane.

The *middle* ligament, which runs along theſe two bones, and adheres to the poſterior and external angle of the *Tibia*, and to the adjacent angle of the *Fibula*, is called *Interoſſeous*. It is compoſed, as well as the middle ligament of the *fore Arm*, principally of two planes of very oblique fibres, which croſs each other, and appear to be multiplied here and there. This ligament is generally perforated above and below, for the paſſage of veſſels; and it ought to be looked upon as a partition, which ſerves as a kind of ſupport for ſeveral muſcles.

The *Tibia* is alſo joined at its inferior part with the *Fibula*, and both of them are connected with the *Aſtragalus*. In the firſt of theſe articulations, the *Tibia* receives into the cavity of its external ſurface a portion of the eminence of the *Fibula*, which correſponds

reſponds to the *Aſtragalus*; and in the articulation of the *Aſtragalus* with the *Fibula*, the remaining portion of this laſt is received into the cavity of the *Aſtragalus*; and there is but one and the ſame *capſulary* membrane for both theſe articulations. As for the ligaments which fortify them, we obſerve four for the articulation of the *Tibia* with the *Fibula*, and three for that of the *Fibula* with the *Aſtragalus*. Of theſe four ligaments, there are two anterior and two poſterior, and both come from the *Tibia* to be inſerted in the *Fibula*: the two anterior are united with each other, and the ſame holds true of the two poſterior. Theſe ligaments are much ſtronger than thoſe found in the articulation of the ſuperior part of the *Tibia* with the *Fibula*. Beſides theſe four ligaments, there are alſo ſeveral very ſtrong fibres which join the *Tibia* to the *Fibula*. Theſe fibres are very obſervable when we ſeparate theſe two bones a little from each other.

As for the ligaments which fix the *Fibula* to the *Aſtragalus*, they are diſtinguiſhed into internal, middle, and poſterior: the anterior and middle ariſe from the inferior and external edge of the *Malleolus externus*. The interior runs obliquely from without inwards, in order to terminate at the edge of the *Groove* of the *Aſtragalus*. The middle ligament, which is thinneſt, terminates in the external ſurface of the *Calcaneum*. The poſterior ligament is itſelf more conſiderable than the other two: it is fixed to the inferior and internal edge of the *Malleolus externus*, and terminates in the unequal depreſſure which both externally and poſteriorly runs along the inferior part of the *Aſtragalus*.

The ſuperior articulation of the *Fibula* with the *Tibia* is an obſcure *Arthrodia*, which only permits the *Fibula* to move but a very ſmall way backwards and forwards. Some maintain that this motion is neceſſary, that the *Fibula*, which principally ſerves for

for the inſertion of ſeveral muſcles of the foot, may yield a little in the violent efforts of theſe muſcles, without which it would have been ſubject to break in violent running, jumping, or in carrying heavy burdens. The articulation of the *Fibula* with the inferior part of the *Tibia*, ſeems to partake of the *Diarthroſis* and the *Synarthroſis*. It is almoſt immoveable, and ſeems to be only a kind of ſupport to the ſuperior part of the Fibula in its ſmall and inconſiderable motions.

The foot is joined by the middle of the *Aſtragalus* to the *Tibia*. This articulation is a perfect ginglymus, which only permits to the foot the motions of flexion and extenſion: it is fortified by the two *Malleoli* which are joined to the lateral parts of the *Aſtragalus*, and whoſe internal is formed by the *Tibia* itſelf; and the external, which is much more conſiderable, and deſcends lower, is formed by the *Fibula*. The *Malleoli* hinder the *Aſtragalus* from ſlipping to either ſide; or if they ſuffer any ſuch thing, it muſt be at the riſque of their fracture or ſeparation, or at leaſt of a very violent extenſion of the ligaments which ſtrengthen this articulation. The celebrated Mr. *Petit*, if I am not miſtaken, was the firſt who obſerved that the lateral flexions of the foot, or its motions of *adduction* and *abduction*, by no means depended on the articulation of the *Aſtragalus* with the *Tibia*.

The principal ligaments of the articulation of the *Aſtragalus* with the leg are lateral; ſome proceed from the *Malleolus externus*, and terminate in the *Calcaneum* and *Aſtragalus*, as I have before obſerved. The others proceed from the *Malleolus internus*. Theſe laſt are three in number, one *anterior*, one *middle*, and one *poſterior*. They have all their beginnings at the inferior edge of the *Malleolus internus*, where they are as it were confounded and mixed. The anterior ſeems only to be formed of

ſome fibres, which are very cloſely united with the capſula of the articulation; they terminate at the anterior and ſuperior part of the *Aſtragalus*. The middle ligament adheres to the lateral internal part of this bone, and the poſterior alſo terminates in it, at the ſide of the middle, but farther backwards: theſe two laſt ligaments are very ſtrong. Beſides theſe ligaments, we diſcover another pretty conſiderable one, called the *annular Ligament*. It is principally deſtin'd for the paſſage of the extenſor tendons of the toes, and is fixed to the anterior and inferior part of the *Tibia*, on the ſide of the *Malleolus internus*, whence paſſing obliquely over the *Aſtragalus*, it is divided into two portions, one of which terminates in the ſuperior and anterior part of the *Calcaneum*, and the other in the lateral internal part of the *Scaphoide*.

The articulation of the *Aſtragalus* with the *Calcaneum* is formed by an eminence received into a cavity of the *Aſtragalus*, and by two ſmall ſurfaces. Theſe are as it were ſo many balls and ſockets, which do not permit very ſenſible motions. The articulation of the *Aſtragalus* with the *Scaphoide*, is a more perfect ball and ſocket than the others now mentioned; ſince the eminence and cavity of this articulation are more conſiderable. As for the articulation of the *Calcaneum* with the *Cuboide*, it is only formed by two ſmall ſurfaces applied to each other. It is alſo a kind of ball and ſocket, which only permits ſmall motions.

'Tis on the articulation of the *Aſtragalus* with the *Scaphoide* bone, and on that of the *Calcaneum* with the *Cuboide*, that the lateral flexions of the foot, or its motions of *Adduction* and *Abduction*, while the *Aſtragalus* remains immovable, principally depend.

The articulation of the *Cuneiform* bones with each other, that of the third of theſe bones with the *Cuboide*, that of theſe four bones with thoſe of the *Metatarſus*,

tatarſus, and laſtly that of the bones of the *Metatarſus* with each other, form ſo many balls and ſockets, which do not permit very ſenſible motions. 'Tis by means of theſe articulations that a perſon can crook his foot according to its length, and but very little according to its breadth. This laſt motion is more apparent towards the heads of the bones of the *Metatarſus*, than towards their baſe and the bones of the *Tarſus* which are adjacent.

All theſe motions of the bones of the *Tarſus* and *Metatarſus* are ſufficiently ſenſible in children, but are often loſt ſoon after the uſe of ſhoes, eſpecially thoſe of the ſmall bones of the *Tarſus* and thoſe of the *Metatarſus*. The high-heeled ſhoes of women entirely change the natural ſtate of theſe bones.

The articulation of the firſt phalanges of the toes with the bones of the *Metatarſus*, is an *Arthrodia* which permits them to move in various directions: that of the phalanges with each other is a groove, which only permits their flexion and extenſion. Theſe motions are very free in a natural ſtate, and are not generally loſt but by improper ſhoes, which often prove the reaſon why the phalanges of the ſmall toes are as it were ſodder'd to each other, and become immovable.

I now proceed to conſider theſe ligaments which fix the different pieces which compoſe the foot to each other. Beſides the ligaments which join the *Aſtragalus* to the two bones of the leg, we find others which fix it to the *Calcaneum* and the *Scaphoide*: there are five principal ones which fix it to the *Calcaneum*; the firſt riſes from the external ſurface of this bone, and loſes itſelf in the angle, which inferiorly terminates the external ſurface of the *Aſtragalus* which correſponds to the *Fibula*. We alſo obſerve other three ligaments in the groove of the *Aſtragalus*, which fix that bone to thoſe parts of the *Calcaneum* which correſpond to this groove. And

laſtly, we diſcover a fifth ligament, which begins at the eminence which is at the ſuperior part of the internal ſurface of the calcaneum, and this ligament terminates interiorly at the edge of the inferior ſurface of the *Aſtragalus*. Over the capſulary membrane we obſerve ligamentary fibres, in the places where it is not covered by the ligaments I have now mentioned.

The ligaments which fix the *Aſtragalus* to the *Scaphoide* are not diſtinct from each other: we only obſerve ſeveral pretty ſtrong ligamentary fibres, which riſe almoſt from all the circumference of the anterior eminence of the *Aſtragalus*, and terminate at the *Scaphoide*, covering the capſulary membrane. Laſtly, we find a pretty ſtrong ligament, which riſes from the ſuperior and middle part of the *Calcaneum*, and terminates in the inferior and middle part of the *Aſtragalus*.

The *Calcaneum* is joined to the *Scaphoide* and *Cuboide* by ſeveral ligaments, the moſt conſiderable of which runs along its inferior and external part, where it takes its riſe clear to its tuberoſity, and terminates in the *Cuboide*; and even ſome fibres of this ligament advance to the bones of the *Metatarſus*. We alſo find two other ligaments, which fix the *Calcaneum* to the *Cuboide*. Theſe proceed from its anterior eminence, namely, one from its ſuperior and another from its inferior edge, and terminate in the *Cuboide*. As for the ligaments which fix the *Calcaneum* to the *Scaphoide*, we find two principal ones, one of which riſes from the ſuperior edge of the anterior prominence of this bone, and the other from the interſtice obſervable between the two ſmall ſurfaces which are in its ſuperior and anterior parts; theſe two ligaments terminate in the *Scaphoide*, namely, one in its lateral external part, and the other at the foot of its lateral internal part. 'Tis alſo to be obſerved, that the *Calcaneum* is joined to the *Scaphoide* by a portion of that conſiderable ligament which I have

have ſaid runs along its inferior part and joins the cuboide.

The *Scaphoide* is fixed to the *Aſtragalus* and *Calcaneum* by the ligaments I have now deſcribed. Beſides theſe, there are ſeveral other which join the *Scaphoide* to the *Cuboide*, and to the three *Oſſa Cuneiformia:* the firſt riſes from the ſuperior and external part of the *Scaphoide*, and terminates on the ſuperior ſurface of the *Cuboide:* the ſecond riſes from the external and inferior part of the *Scaphoide*, and terminates in the poſterior angle of the *Cuboide*. The ligaments which fix the *Scaphoide* to the three *Oſſa Cuneiformia* are four in number, two of which come from the tuberoſity of the *Scaphoide*, and terminate at the firſt *Cuneiform:* the two others riſe from the ſuperior part of the *Scaphoide*, and terminate on the ſuperior ſurface of the ſecond and third *Cuneiform.*

The *Cuboide*, beſides the ligaments which fix it to the *Calcaneum* and the *Scaphoide*, has alſo others which fix it both above and below to the third *Cuneiform* and the laſt of the *Metatarſus.* The ſuperior ligaments are very flat, and we may reckon four of them, which run from one bone to the other; that is to ſay, ſome go from the laſt *Cuneiform* to the *Cuboide*, and others from the *Cuboide* to the bones of the *Metatarſus.* The inferior ligaments are very ſhort, and are alſo four in number, running alſo from one bone to another. The *Cuboide* alſo ſeems to have a connection with the third bone of the *Metatarſus.*

The three *cuneiform* bones are fixed to the *Scaphoide* and *Cuboide* by the abovementioned ligaments: they are joined together at their ſuperior part by particular ligamentary planes, which run more or leſs tranſverſely from one bone to another, being united to a common ligamentary plane, which not only covers them all, but alſo extends itſelf over

the *Cuboide*. Theſe bones are united together in their inferior part by thicker and ſtronger ligaments: they are alſo joined at their ſuperior and inferior parts with the four firſt bones of the *Metatarſus*, by ſeveral ligaments; thoſe of the ſuperior part are only very ſhort ligamentary planes or bands, which riſe from the anterior part of theſe bones, and run to the laſt of the four laſt bones of the *Metatarſus*: the ligaments of the inferior part are ſtronger, and not much longer than the former; we muſt however except one ligamentary band, which comes from the third cuneiform and terminates at the poſterior part of the fifth bone of the *Metatarſus*, at the extremity of its apophyſis: this ligamentary band communicates with that conſiderable ligament which I have ſaid runs along the external and inferior part of the *Calcaneum*.

The bones of the *Metatarſus*, beſides the ligaments which join them to the *Oſſa Cuneiformia* and the *Cuboide*, have alſo particular ones which fix them to each other: we may diſtinguiſh theſe into ſuch as join theſe bones at their baſes, and ſuch as unite them at their heads. The ligaments which unite them at their baſe are ſuperior and inferior, both of which are very ſhort, reaching but from the one to the other of theſe bones: the ſuperior are flat, and the inferior are very ſtrong, and for the moſt part inſinuate themſelves into the interſtices of the bones, in order to join them the more ſtrongly. The ligaments which fix the bones of the *Metatarſus* at their heads are alſo ſuperior and inferior, both of which are very ſhort, and only extend from one bone to another. The inferior have this particular, that they advance farther among the heads, and keep them at ſome diſtance from each other. Theſe ligaments are ſtrengthen'd by their union with the tendinous bands of the *Aponeuroſis*, which covers the

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ſole of the foot, and of which I ſhall ſpeak in the *Myology*.

The firſt phalanges of the toes are fixed to the heads of the metatarſal bones by a kind of orbicular ligament, ſuch as that found in all the other articulations by the ball and ſocket. We obſerve that in the four toes following the thumb, the inferior part of theſe ligaments is thicker, and even as it were incruſtated with a kind of cartilaginous ſubſtance, which is fixed to the baſe of the phalanx and advances under the head of the adjacent bone of the metatarſus: it becomes indurated by age.

The articulation of the firſt phalanx of the toes with the bones of the metatarſus, is ſtrengthen'd by the tendons of the interoſſeous muſcles. As for that of the other phalanges, as it is a perfect *Ginglymus*, inſtead of an orbicular ligament there are two lateral ones, which are ſtrongly fixed to the capſula of the joint; for it is to be obſerved, that the capſular membrane does not differ in the bony pieces which compoſe the foot, from that which I have ſaid is found in the joinings of the bones of the hand; it riſes in each of theſe pieces, from the edges of the cavity which receives, and terminates at the circumference of the eminence which is received.

Of the Seſamoide Bones.

In adult ſubjects we find in the articulations of the fingers of the hand and toes of the foot, certain ſmall bones, called *Seſamoide*, from their reſemblance to *Seſam** ſeeds: their bulk is not always the ſame, ſince they are larger in ſome than in other parts. Their moſt general ſituation in the hand is at the poſterior and inferior part of the firſt phalanx of the thumb, on which they ſlide during its flexion, and at the internal and inferior part of the bones of the *Metacarpus*. As for thoſe found in the foot, they are

* Like ſmall Indian grain, and ſometimes not unlike poppy ſeed.

moſt generally ſituated at the anterior and inferior part of the bones of the *Metatarſus*. All theſe bones are fixed to ligaments: they are cartilaginous in children, for which reaſon they are only found in ſubjects pretty well advanced in years. When there are two ſeſamoide bones in the ſame articulation, as is obſervable in that of the firſt phalanx of the *Metatarſus* with the firſt *Phalanx* of the great toe, they are fixed to each other by a very ſhort ligament, and the canal which they leave between them is for the paſſage of the flexor tendon of the great toe. But when there is only one ſeſamoide bone, it is placed in the middle, and the tendon paſſes immediately over it. Sometimes there are other ſeſamoide bones beſides theſe I have mentioned, namely, one upon the external *Condyle* of the *Femur*, another in the internal *Condyle*, and another in the hand, at the inferior and external part of the bone of the *Metacarpus* which ſupports the fore finger, under the tendon of its *Abductor* muſcle; and laſtly, one in the foot in the ſinuoſity of the *Cuboide*, under the tendon of the poſterior *muſculus Peronæus*. The uſe of the ſeſamoide bones principally regards the tendons of the muſcles, whoſe ſtrength they augment, and facilitate their motion, almoſt in the ſame manner as the rotula does with reſpect to the extenſors of the leg.

Of the Skeleton of the Fœtus.

I Shall not here examine into the various changes which happen to the bones of the fœtus from the firſt month of its formation till the ninth; and how from membranous, as they are at firſt, they afterwards become cartilaginous*, and at laſt acquire the conſiſtence which they have at the ninth month; I

* See *Kirkring*. Oſteogen foetuum.

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ſhall only ſay ſomething of the ſtate in which they are at that time.

There are two principal obſervations to be made concerning the ſkeleton of a *Fætus* come to its full time; 1*ſt*, the bones which enter the compoſition of the organs of ſenſe, or which are deſtin'd for their preſervation, are firſt perfected, ſuch as the oſſeous and ſpongious laminæ of the ethmoide bones, the ſmall bones of the ear, and thoſe which form the orbits: 2*d*, almoſt all the bones of the fœtus are compoſed of various pieces, united with each other by very flexible but thick cartilages, as is obſervable in the *Os ſacrum*, the *Sternum*, and even the *Vertebræ*, each of which is compoſed of three pieces, or the *Occipital*, which is formed of four; or this union is formed by membranes, as we obſerve in the two pieces which compoſe the coronal. 'Tis alſo to be obſerv'd, that the bones of the *Cranium* are only united with each other by membranes of a pretty conſiderable extent, eſpecially at the *Fontanell:* and laſtly, that all the large bones are cartilaginous at their articulations; and that the ſmall bones, ſuch as thoſe of the *Carpus*, *Tarſus*, *Coccyx*, and *Rotula*, are entirely cartilaginous. 'Tis ſufficiently manifeſt, that all theſe particularities of the ſkeleton of a fœtus are of great advantage in facilitating *deliveries*.

However uncertain the judgment is which we can paſs on the age of a fœtus brought into the world before the due time, yet ſome pretend that it may be known by the length of the body, from the crown of the head to the ſole of the foot, and others by its weight. According to the opinion of the former, a fœtus of three weeks, is about ſeven lines long; That of a month, thirteen lines and a half; That of ſix weeks, an inch and ſeven lines; That of two months, two inches and one line; That of three months, two inches ten lines and a half; That of four

four months, five inches and a half; That of five months, eight inches; That of ſix months, eight inches and ten lines; That of ſeven months, nine inches and nine lines; That of eight months, a foot all but a line; That of nine months, which is the full time, thirteen inches eight lines and a half.

Among thoſe who pretend to judge of the age of a fœtus by the weight of its body, I know none but *Mauriceau* who has wrote on this ſubject*. He ſays, that if we conſider all the proportions of the body of a ſtrong child born at the end of nine months, with reſpect to the proportion of a fœtus of three months, we will find that that of the nine months generally weighs twelve pounds, ſixteen ounces to the pound. He adds, that he has ſeen ſome who weighed fourteen pounds. But the fœtus of three months will only weigh three ounces at moſt; that is to ſay, it will weigh ſixty-four times leſs than the child of nine months, which weighs twelve pounds. Now as the term of three months is only the third of nine, and as that of one month is alſo the third of three, we ſhall in like manner find that the proportion of the body of the fœtuſes of theſe two premature terms, correſponding to this firſt demonſtration, the fœtus of one month will only weigh half a drachm, that is to ſay, it will weigh ſixty-four times leſs than a *Fœtus* of three months; and as the term of ten days is alſo the third of a month, ſo a fœtus of ten days ought to weigh but about half a grain. He adds, that theſe obſervations are ſo many facts, verified and confirmed by experience.

* See this author in his treatiſe of midwifry, *tom.* 1. *chap.* 5.

PART

PART II.

Of SARCOLOGY.

SECTION I.

Of MYOLOGY.

CHAP. I.

Of the Muſcles in general.

THAT part of *Anatomy* which treats of the muſcles is called *Myology*, from two Greek words which in our language ſignify a diſcourſe of the muſcles.

A *Muſcle* is an organ deſtin'd for performing all the motions of the body: it is principally compoſed of ſeveral particular fibres, diſtinguiſhed by the epithet *moving*, of which one portion is fleſhy and another tendinous. Theſe fibres are arranged into bundles or packets, ſituated at the ſide of and along each other: theſe bundles are included in ſo many ſheaths, which are joined to each other: theſe ſheaths, which are membranous and cellular, ſeem to be the continuations of the membrane which covers every muſcle in particular.

The capillary extremities of the arteries and veins diſtributed to each muſcle, by their numerous ramifications, form ſurpriſing pieces of net-work upon the fleſhy ſubſtance of the *moving Fibres*; and the nerves, by their moſt delicate diviſions, ſeem to fix theſe fibres to each other.

Almoſt in the whole order of the muſcles, we generally conſider their bodies and their extremities: the body

body of the muſcle, which is its fleſhy portion, generally poſſeſſes the middle part, and is commonly called the belly of the muſcle. Its extremities are called *Tendons* and *Aponeuroſes:* they are called *Tendons*, when the fibres which compoſe them are collected or aſſembled in the form of a cord; and they are denominated *Aponeuroſes* when theſe ſame fibres, inſtead of being collected in form of a cord, are ſpread into membranes.

The arrangement of the moving fibres is not the ſame in all the muſcles; there are ſome in which their fleſhy and tendinous portions deſcribe the ſame line, ſuch are the abdominal muſcles, called *oblique*, and *tranſverſe*, &c. There are others in which the tendinous portions form oppoſite angles with the fleſhy part, ſuch are the two *Muſculi gemini* which extend the foot, *&c.* There are ſome whoſe moving fibres are arranged like rays, as is obſervable in the *crotaphite** muſcles of the jaw, *&c.* There are alſo others whoſe fibres form entire circumvolutions, ſo that their extremities meet and unite with each other; ſuch are the *Orbicular* of the eyelids, the *Sphincter* of the anus, *&c.*

The muſcles are, with reſpect to their moving fibres, divided into ſimple and compound: the ſimple muſcles are thoſe, in whoſe compoſition we find but one order of fibres; and the compound muſcles are thoſe, in which there are two or more orders of fibres.

We are to diſtinguiſh two kinds of ſimple muſcles, namely, thoſe whoſe fleſhy fibres follow the length of the body of the muſcle which they compoſe, advancing to the tendons or aponeuroſes found at the extremities of the muſcle; ſuch are the abdominal muſcles called *Recti* and *Tranſverſales*, &c.

* The muſcles of the under jaw are ſo called.

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The other ſimple muſcles have not their fleſhy fibres directed according to the length of the body of the muſcle, ſince they run obliquely from one ſide of the muſcle to the other, in order to loſe themſelves in two aponeurotic expanſions, which run thro' all its length, and terminate in the tendons of the muſcle; ſuch are the muſcles of the leg, call'd *Semi-nervous* and *Semi-membranous*, &c.

As for the compound muſcles, we ought alſo to diſtinguiſh them into two ſorts: the former only preſent us in their compoſition with two orders or arrangements of oblique and very ſhort fleſhy fibres, which in one part adhere to an aponeurotic expanſion furniſhed by one of the tendons of the muſcle, and in the other to the oppoſite tendon, which advancing into the ſubſtance of the muſcle, and continuing all along the middle of its body, ſeparates its two orders or arrangements of fleſhy fibres, almoſt in the ſame manner as we ſee in the feathers of fowls, the filaments of each beard fixed to the ſtalk which ſeparates them; for which reaſon theſe muſcles are called *Penniform*, from the latin word *Penna*, which ſignifies a quill or feather.

As for the other muſcles of this kind, they juſtly deſerve the name of compound; for in their ſubſtance we obſerve ſeveral orders or arrangements of fleſhy fibres, which conſtitute as many ſimple muſcles, which give theſe muſcles very great ſtrength; ſuch is the *Deltoide* muſcle, *&c**.

Some have alſo divided the muſcles into *full* and *hollow:* they call the full muſcles thoſe which have no ſenſible cavity in their ſubſtance, and which are deſtin'd to move the bones, or ſome particular organ; ſuch are the muſcles of the eyes, tongue, arms, legs, *&c.* They give the name of hollow muſcles

* See Stenon ſpecim. myol.

to

to thoſe whoſe fibres are ſo arrang'd as to form a cavity to lodge the ſubſtances, whether ſoft or fluid, which ought to receive ſome agitation from the muſcle. Among theſe they reckon the heart, the ſtomach, the inteſtines, the bladder, *&c.* There are others who deny the name of muſcles to theſe laſt, and only call them *muſcular Parts.*

Beſides theſe, the muſcles have received various names, in particular, *1ſt*, with reſpect to their bulk, they are called *vaſt*, *ſlender*, *great*, *ſmall*, &c. *2d*, with reſpect to their figure, they are called *Trapezia*, *Rhomboides*, *Scalenum*, &c. *3d*, with reſpect to their adherence, they are called *Sternocludo-maſtoideous Genio-gloſſal*, &c. *4th*, with reſpect to the direction of their fibres, they are called *oblique* and *tranſverſe*, &c. *5th*, with reſpect to their ſituation, they are called *Frontal*, *Occipital*, &c. and laſtly, with reſpect to their functions, ſome are called *Elevators*, *Depreſſors*, and others, *Adductors*, *Abductors*, &c. As for theſe laſt, it is proper to obſerve that their functions are not confined to the ſimple uſes which their names expreſs, theſe muſcles having ſeveral others, according to their different adheſions and the changes of poſture in the body.

The full muſcles are fixed to two different parts, one of which is carried along by the action of the muſcle, while the other remains at reſt during that action. Theſe two places are commonly called fixed and movable adheſions: but it is to be obſerved, that the fixed adheſion does not always remain the ſame, except in thoſe muſcles which in one part adhere to the bones, and in another to the ſoft parts; ſuch are the muſcles of the eyes, tongue, *&c.* for in almoſt all the other muſcles which are fixed to the bones by their extremities, that extremity which in a particular ſituation was fixed, becomes the movable adheſion in a contrary attitude. 'Tis therefore pretty certain that the uſes

of moſt of the muſcles are not confined to thoſe commonly aſcribed to them; for example, the muſcles which are only thought to move the *Humerus* on the *Omoplata*, may in certain caſes move the *Omoplata* on the *Humerus*, &c.

A muſcle is capable of two motions, one of extenſion or elongation, and another of contraction or abbreviation. 'Tis principally in this laſt motion that the muſcle acts, its extremities at that time endeavouring to approach each other, carry along with them the ſolid parts to which they are fixed, if they are movable; or only to bring the movable part towards that which is leſs ſo, or which remains fixed during this action. If the muſcle is hollow, by its contraction it compreſſes the ſubſtances, whether ſolid or fluid, contained in its cavity.

The extenſion of a muſcle is by moſt anatomiſts only looked upon as a kind of paſſive motion; and I know none but Mr. *Winſlow**, who from particular obſervations had advanced, that the action of the muſcles in general conſiſts no leſs in the determined relaxation of the moving fibres, than in the determined contraction of theſe fibres, whether this action is performed gradually or inſtantaneouſly.

This author ſupports his opinion by various obſervations, among which I ſhall only inſtance that relating to the flexion of the head. This motion of the head, in whatever attitude, is commonly aſcribed to the contraction of ſeveral muſcles, the principal of which, called the *Maſtoideans*, are fixed below to the *Sternum* and *Clavicles*, and advancing on each ſide towards the head, terminate at the *maſtoide* apophyſes. This celebrated anatomiſt ſhews, that theſe muſcles only act when a perſon, ſtanding or ſitting with his head more or leſs reclined, inclines to move it forwards, which he proves by the

* See mem. de l'academie royale, 1720.

firm

firm and ſteady condition of theſe muſcles at that time: but if a perſon is ſtanding with his head upright, and wants to bend it forwards, this motion by no means depends on theſe muſcles, but rather on the weight of the head; and the extenſor muſcles, at that time, by lengthening themſelves more or leſs at pleaſure, regulate that motion; for without the aſſiſtance of theſe muſcles the head would naturally fall forwards, as we obſerve in thoſe who when ſitting fall aſleep or are indiſpoſed. The ſoftneſs and laxity of the *Maſtoidean* muſcles in this attitude, ſufficiently proves that they do not act. From what I have ſaid, we may ſee that there are motions in which the muſcles commonly thought to produce them have no ſhare, and which depend entirely on the determined relaxation of the muſcles on the oppoſite ſide.

There are muſcles whoſe motions are entirely mechanical or involuntary, that is to ſay, depending only on the diſpoſition of the machine, without any concurrence or act of the will; ſuch are the *heart*, the *ſtomach*, and *inteſtines*; and their contraction and extenſion continuing without interruption, and ſucceeding each other.

There are other muſcles which, tho' diſpoſed to motion by the natural conſtitution of the body, nevertheleſs ſtand in need of the determination of the will to move them; ſuch are the muſcles of the ſuperior and inferior extremities, *&c.* whoſe motions are voluntary.

Laſtly, there is a third kind of muſcles, whoſe motions are always continued, but which the will may augment or diminiſh, and even interrupt for ſome moments; ſuch are the muſcles ſubſervient to reſpiration, which the antients ſaid had a mixed motion, and which may be looked upon as purely mechanical, when a perſon breaths without adverting to it, and as a voluntary motion when a perſon augments,

augments, diminiſhes, or ſuppreſſes preſpiration according to his will.

Almoſt all the muſcles are ſeconded or aſſiſted by others which have the ſame function, and which are called *congenerate*, to diſtinguiſh them from another ſpecies of muſcles called *antagoniſt*, becauſe they are deſtin'd for contrary actions; the flexors, for example of one member, have the extenſors for their antagoniſts; the *heart* has its auricles for its antagoniſts: the *ſphincter* of the *anus* has for its antagoniſts, not only the fleſhy coat of the inteſtines, but alſo the abdominal muſcles and the diaphragm.

When the *congenerate* and *antagoniſt* muſcles act at the ſame time, they render the part ſtiff and immovable. The action of theſe muſcles in this ſtate of ſuſpenſion, is called the *tonic Motion*; and that is called the *combined Motion*, or *Motion of Circumduction*, which depends on the ſucceſſive action of all the muſcles of a part; ſuch is the motion of the hand or arm, when a perſon turns the handle of a wheel, or pulls the ſpoke of a preſs, *&c.*

'Tis to be obſerved, that 'tis not only in the *tonic* motion that all the muſcles of a part act together; ſince theſe ſame muſcles alſo act in concert, but more or leſs, in order to put the part in a determined ſituation: for inſtance, to raiſe the arm, all the muſcles which can move it in different directions co-operate to the production of this motion. Some raiſe it upwards, and theſe are the *elevator* muſcles; others regulate this motion by counterballancing it to the oppoſite direction, and theſe are called the depreſſor muſcles: and laſtly, others ſituated on each ſide direct this motion, and are called the *Adductors* and *Abductors* of the arm. I have before obſerved, that theſe muſcles act more or leſs, becauſe 'tis probable, that in the preſent caſe the *Elevators*

of the arm are in a more conſiderable degree of action than its *Depreſſors*, &c.

The different ſituations of the body, whether ſtanding or ſitting, alſo furniſh us with examples of this co-operation of the muſcles, which is alſo obſervable in walking, *&c.*

'Tis principally on the fleſhy portion of the muſcle that its *Contraction* or *Abbreviation* depends, during which this portion appears more inflated and hard than in the ſtate of inaction, which is eaſily diſcovered in the *crotaphite* and *maſſeter muſcles* of the inferior jaw, *&c.* when they act; and if we view this fleſhy portion laid bare in a living animal, we may perceive that the fibres which compoſe it are gathered together, and bent as it were from one end to the other, in the manner of very fine zie-zaes*, during the contraction of the muſcle.

As the tendons yield but very little, they ought to be only conſidered as ſo many elongations neceſſary for fixing the muſcles to diſtant parts. Thus 'tis obſervable, that the fleſhy portion is found in all muſcles, whereas the tendinous portions are in ſome ſo ſmall, that they ſeem to be wanting.

As for the immediate cauſe of the action of the muſcles, various hypotheſes have been formed for explaining it. For this purpoſe, recourſe has been had to the *blood*, the *air*, and the *ſpirits*, which have been ſuppoſed to act in theſe organs, either by ſimple *effuſion*, *fermentation*, *exploſion*, *effervescence*, &c. but however ingenious theſe hypotheſes at firſt ſeem to be, yet they are only probabilities, which inſtead of carrying full conviction along with them, lay a foundation for new doubts, which they by no means clear up. In a word, it appears to me, that from none of theſe hypotheſes we have been able to explain ſome phænomena mentioned by Mr. *Winſlow*,

* Things indented.

concerning the motion of the muſcles, ſuch as the determination of this motion, its determined duration, and the determined augmentation or diminution of this duration; and in a word, the promptitude or quickneſs with which ſome of theſe determinations are changed and altered.

'Tis highly probable that the difficulty of explaining muſcular motion in a ſatisfactory manner, ariſes principally from our unacquaintance with the intimate ſtructure of the *moving* fibres, which has been ſuppoſed *ſpongious*, *veſicular*, *twiſted*, *elaſtic*, &c.

The ſtrength of the muſcles depends principally on two things, *1ſt*, on the great number of fleſhy fibres which enter their compoſition; *2d*, on the greater or ſmaller diſtance between their adheſion to the part they ought to move, and the articulation on which that part moves which lays a foundation for diſtinguiſhing in each muſcle two ſorts of forces, one abſolute and another relative.

The abſolute force or ſtrength of a muſcle, is that which it only derives from its compoſition; and its relative force, is that which it acquires by the particular diſpoſition of its adheſion to the part which it ought to move.

In order the better to comprehend what I have ſaid, 'tis to be obſerved that the muſcles, which are only fixed to the bones, act as ſo many powers upon a *lever*.

By the term lever we commonly mean a long body, more or leſs flexible, ſuch as a bar of iron, a ſpoke, *&c.* in order to remove bodies, or raiſe burdens, whoſe reſiſtance would be too great and ſometimes inſurmountable without this aſſiſtance.

In a lever working we are to conſider three things, namely, the power, the *fulcrum*, and the reſiſtance or weight to be raiſed.

The *power* is the force applied to the lever; the *fulcrum*, or ſupport, is the immovable point on which one or both of the extremities of the lever move; and the *reſiſtance* or *weight* is the body to be raiſed, or which we intend to move from one place to another.

'Tis to be obſerved that the power, the fulcrum, and the reſiſtance, may have three different diſpoſitions, which has laid a foundation for three ſorts of levers.

The lever of the firſt kind, is that in which the power is at one of the extremities, the reſiſtance at another, and the fulcrum or ſupport between both. Paviors furniſh us with an idea of this ſort of lever: the hand ſupported on the moſt diſtant extremity of the lever, which they employ for raiſing a ſtone, is the power; the ſtone under which they inſinuate the oppoſite extremity, is the reſiſtance or weight; and the adjacent ſtone on which the lever moves, is the fulcrum or ſupport.

Sciſſars, pincers, forceps, *&c.* are alſo levers of this kind; but in each of theſe inſtruments there are two levers, whoſe common fulcrum is the nail which joins them together.

The ſecond ſpecies of lever, is that which has its fulcrum at one of its extremities, the power at the other, and the reſiſtance betwen the two. To this ſpecies of lever we refer the knives of tobacconiſts, whoſe fulcrum is at the fixed extremity, the power or hand applied at the oppoſite extremity, and the reſiſtance or tobacco to be cut between the two.

The lever of the third kind is that which has its fulcrum at one of its extremities, the reſiſtance at the other, and the power between the two. Braſiers furniſh us with an idea of this lever, when in order to ſcrape a piece of braſs or copper, they place one extremity of the handle of the ſcraper on their ſhoulder,

der, and then laying hold of it in the middle, make the other extremity act on the piece which they are preparing. The ſhoulder on which the extremity of the handle of this inſtrument reſts, is the fulcrum, the reſiſtance is at the other extremity which ſcrapes, and the power is the hand applied between both.

The hand is diſpoſed upon this inſtrument in the ſame manner as the muſcles are with reſpect to the bones, in moſt of our members, and 'tis this laſt ſpecies of lever which is obſervable in them: for taking the leg for example, the *Tibia*, which is its principal bone, is the lever; and I ſay that its articulation with the *femur* ought to be conſidered as the fulcrum, or fixed point of the lever. The place of the inſertion of the muſcles in the *Tibia*, whether the extenſors or flexors of the leg below, and at ſome diſtance from this articulation, ought to be looked upon as the part where the power acts; and all the reſt of the *Tibia*, which is beyond the adheſion of theſe muſcles, as the reſiſtance or weight to be moved.

In mechanics 'tis a received principle, that the force applied to the lever becomes ſo much the more conſiderable, as it is more diſtant from the *fulcrum*; ſo that of courſe, the force of the muſcle is more or leſs, according as its connection is more or leſs diſtant from the articulation on which the part moves: we ought not therefore to be ſurprized if in theſe parts of the body, where the muſcles require ſo much force for performing the reſpective functions of theſe parts, ſuch muſcles are compoſed not only of a great number of bundles of fleſhy fibres, but alſo have their adheſions or organs, at a diſtance from the articulation on which the part moves. This is obſervable in the *deltoide* muſcle, the elevator of the arm, the *faſcialata*, the extenſor of the thigh, &c.

The crataphites and maſſeters, which are the elevator muſcles of the inferior jaw, alſo furniſh examples of what I have ſaid: their compoſition, and ſtill more, the diſtance of their origin from the articulation of the jaw bone, enable us by the aſſiſtance of the teeth to break very hard bodies, ſuch as nuts, *&c.* eſpecially if we place the bodies we intend to break between the molary teeth, according to that certain principle, that the power is augmented in proportion as the reſiſtance is nearer to the fulcrum. The ſciſſars, ſo commonly uſed, are ſufficient to explain this principle; for every body knows, that in order to cut a card or any ſimilar body more eaſily, we muſt bring it as near as poſſible to the nail which joins the two branches, that is, to the fulcrum.

But if moſt of our members furniſh examples of this third ſpecies of lever, as I have already obſerved, the foot in its motions alſo furniſhes us with inſtances of the other two. If, when the leg is at reſt, there ſhould be under the extremity of the foot a body which reſiſts, and if an effort ſhould be made to ſurmount that reſiſtance, this will be an example of the firſt ſpecies of lever, whoſe fulcrum is between the power and the reſiſtance; for at that time the foot being ſuppoſed a lever, the power or adheſion of the muſcles which act, is at one of the extremities, ſince it is at the *Calcaneum* or *Heel-bone*, the reſiſtance at the other end of the foot, and the fulcrum, or its articulation with the leg, between both.

The lever of the ſecond ſpecies, where the power is at one of the extremities, the fulcrum at the other, and the weight between both, is obſervable when we ſtand upright on the points of our feet; for then the fulcrum being on the point of the foot, is at one of the extremities of the lever, the power at the other, that is at the heel, ſince 'tis there that the extenſors

extenſors of the foot which are in action terminate, and the burden or weight of the body is between the two.

CHAP. II.

Of the Muſcles in particular.

ARTICLE I.

Of the frontal and occipital Muſcles.

THE ſkin which covers the cranium has ſome motion, eſpecially in its anterior part, where it is conſiderably corrugated and wrinkled in ſome perſons. Theſe motions are performed by the action of four muſcles, namely, the two *frontals*, and the two *occipitals*.

The *frontal* muſcles have their fixed adheſion at the angular apophyſis of the *Coronal*: the fleſhy fibres of theſe muſcles are alſo by gradation immediately joined to the ſkin, advancing to the middle and almoſt ſuperior part of the *Coronal*, running a little obliquely outward, and terminate in an aponeuroſis, which, after having cover'd the crotaphite muſcles, adheres on each ſide along the ſuperior part of the *zygomatic* arch, and joins to that of the *occipitals*.

The *occipital* muſcles have their fixed adheſion immediately above the tranſverſe apophyſis of the *occipital*, advancing to the *maſtoide* apophyſes, and alſo by gradation to the ſkin which correſponds to them, and terminate by an aponeuroſis which is joined to that of the *frontal* muſcles.

The union of theſe aponeuroſes forms a kind of capſular, which adheres ſtrongly by its internal ſurface to the fat and ſkin, and only touches the *peri-*

cranium by means of a cellular texture which permits it to move.

This aponeurotic capſula receives tendinous fibres from the *trapezia* muſcles, *&c.* and alſo communicates with that membranous expanſion which covers the muſcles of the face and poſterior part of the neck, advancing to the ſhoulders, and which appears formed by very thin and broad muſcles placed over all the anterior part of the neck, and which are called *cutaneous.*

The eye-brows are depreſſed and brought near each other by two muſcles called ſuperciliary: they have their fixed adheſion at the middle and inferior part of the *Coronal*, and loſe themſelves in the ſkin which ſupports the eyebrows. Theſe muſcles ſeem alſo qualified for corrugating the ſkin above the noſe.

Of the Muſcles of the external Ear.

The external ear has three muſcles, one *anterior*, and two *poſterior:* the firſt is fixed on one part a little above the root of the *zygomatic* apophyſis, and on the other to the ſuperior and anterior of the *Conchus* or ſhell: of the laſt, one is *ſuperior* and another *anterior*; the ſuperior comprehends ſome fleſhy fibres, fixed to a portion of the aponeurotic capſula which covers the *crotaphite* muſcle; and theſe fibres being reunited, terminate at the ſuperior part of the convexity of the *Conchus:* the inferior has its fixed adheſions at the ſuperior part of the *maſtoide* apophyſis, and terminates at the poſterior part of the convexity of the *Conchus.* The action of theſe three muſcles is but very little perceptible: 'tis thought that they ſerve to contract or dilate the *Conchus*, according to the ſtrength or weakneſs of the undulations of the air which are conveyed to the *Meatus Auditorius.*

Of the Muſcles of the Eye-lids, and thoſe of the Eye.

The eye-lids have two muſcles, namely, one *proper* and one *common:* the firſt belongs to the upper eye-lid, and ſerves to raiſe it; the ſecond is common to both, and ſerves to bring them into contact.

The firſt, called the elevator of the ſuperior eye-lid, has its fixed adheſion at the ſuperior part of the bottom of the *Orbit*, and enlarging itſelf, gradually terminates at the cartilage which is upon the edge of that eye-lid.

The common muſcle, called *orbicular*, is compoſed of ſemi-circular fibres, which unite with each other near the angles of the eye, but principally near the great angle, where they form a pretty ſtrong tendon, which terminates in the anterior part of the maxillary bone, and is called the *naſal Apophyſis.* The fibres of this muſcle are alſo fixed to the circumference of the orbit, and extend about a finger's breadth beyond each eye-lid: they afterwards advance over the eye-lids, in order to cover them, as far as their cartilage, where theſe fibres terminate; ſo that the muſcle in acting ſhuts the eye, by bringing the eye-lids together.

The eye has ſix muſcles, which, with reſpect to their direction, are divided into *ſtreight* and *oblique:* the *ſtreight* are four in number, and there are only two *oblique.*

The ſtreight have received various names from their uſes: the ſuperior is called the *Elevator* of the eye, or the *Muſculus ſuperbus*; the inferior is called the *Depreſſor* or the *Humilis*; that which comes from the ſide of the noſe is called *Adductor* or *Bibitorius*; and the fourth, which is on the oppoſite ſide, is called *Abductor* or *Indignatorius.* All theſe muſcles have their fixed adheſions, according to the order of their ſituation, in the bottom of the orbit, hard by the

the *Foramen Opticum*, at that portion of the *dura Mater* which lines this cavity, and they terminate at the anterior part of the *Cornea Scleratica* by ſo many *Aponeuroſes*, which unite with each other, and advance to the circumference of the *Cornea Tranſparens*.

The *Obliquus Major*, called *Trochlearis*, has its fixed adheſion at the lateral internal part of the bottom of the *Orbit*; its tendon paſſes thro' a cartilaginous ring, called the *Trochlea* or *Pully*, which is ſituated at the edge of the *Orbit*, immediately above the *Canthus Major*; this tendon afterwards ſlips under the *Aponeuroſis* of the *Muſculus Superbus*, and reaches the ſuperior part of the globe, where it terminates at the ſide of the *Canthus Minor* near the *abductor* muſcle.

The *Obliquus Minor* has its fixed adheſion near the edge of the *Orbit* on the ſide of the *naſal Duct*, and advances *obliquely* under the globe of the eye, in order to terminate at its poſterior part, at a ſmall diſtance from the tendon of the *Obliquus Major*.

The uſes of the *Muſculi recti* are partly indicated by the different names given them: when all theſe muſcles act at the ſame time, and equally, they maintain the globe of the eye in a perfect equilibrium; but if two of the moſt contiguous of theſe muſcles act together, they cauſe the eye to make an oblique motion; and if the whole of them act ſucceſſively, the globe performs a kind of circular motion. As for the oblique muſcles, Mr. *Cowper*, a celebrated *Engliſh* anatomiſt, obſerves, that when the *Obliquus Major* acts alone, it makes the eye turn obliquely downwards; and that the *Obliquus Minor* being alone in contraction, puſhes it obliquely upwards, but that when theſe two muſcles act at the ſame time, they carry the globe directly outwards, and as it were in a level with the head.

Of

Of the Muſcles of the Noſe.

We generally reckon ſix muſcles for the dilatation of the noſtrils, three on each ſide, known by the names of *Pyramidalis*, *Obliquus Deſcendens*, and *Obliquus Aſcendens*, called alſo *Myrtiformis*.

The *Pyramidal* has its fixed adheſions along the bones of the noſe, advancing to their ſuperior part, where it is confounded with the frontals, and terminates at the cartilage which forms the entrance of the noſtril on the ſame ſide.

The *Obliquus Deſcendens* has its fixed adheſions along the naſal apophyſis of the maxillary bone, and uniting with the pyramidal, terminates at the ſame cartilage. Several anatomiſts confound this muſcle with the *Inciſor Major* of the lips.

The *Obliquus Aſcendens*, or the *Myrtiformis*, has its fixed adheſions in the maxillary bone, oppoſite to the bottom of the ſocket of the canine tooth, and alſo terminates at the ſame cartilage with the preceding muſcles.

As for the conſtruction or contraction of the noſtrils, it ſeems to depend on the action of ſome fleſhy fibres detached from the orbicular of the lips, to terminate at the edge of the noſtrils and the cartilage which ſeparates them, which is the reaſon why this action is only ſenſible in depreſſing the ſuperior, in order to make it meet with the inferior lip. But this contraction of the noſtrils is never ſo exact and ſtrong as to ſecure us againſt the impreſſions of diſagreeable and unwholeſome ſmells, whatever care we take to cauſe this conſtructor muſcle to act.

Of the Muſcles of the Lip.

The lips perform their motions by ſeveral muſcles, which are diſtinguiſhed into proper and common: the proper muſcles are only ſuch as ſerve to move one lip; and thoſe are called common, which move

move both lips at the ſame time. There are ſeven proper muſcles, four for the ſuperior, and three for the inferior lip. As for the common, there are eleven of them, including the *cutaneous*, which the ancients placed among the depreſſors of the jaw; and this opinion is ſtill followed by ſome moderns.

The four proper muſcles of the ſuperior lip are called inciſory, and are diſtinguiſhed into large and ſmall ſuperior inciſories. Thoſe of the inferior lip are the *Quadratus*, and the two inferior inciſors. The common muſcles, according to ſome authors, are only five in number, namely, the two *Zygomatics*, the *Buccinatores*, and the *Orbicular*, counting the two *Canini* and the *Triangulares* among the proper: however, theſe muſcles loſing themſelves at the place where the lips unite, as I ſhall afterwards ſhew, ſeem incapable of giving motion to one lip, without communicating it to the other alſo.

The *Inciſor Major* is compoſed of two portions united together, one of which is ſuperior and the other inferior: the ſuperior portion compoſes almoſt entirely the muſcle of the noſe, called the *Obliquus Deſcendens*; the inferior, which is the moſt conſiderable portion, has its fixed adheſions at that part of the maxillary bone which conſtitutes the edge of the orbit, and terminates at the ſuperior lip, to raiſe it in conjunction with its *congenerate Muſcle*. There is alſo a muſcle called *Zygomaticus Minor*, which loſes itſelf in the *Inciſor Major*: this muſcle is no more, for the moſt part, than a detachment of the inferior fibres of the orbicular muſcle of the eye lids, and ſometimes 'tis a true *Zygomatic* before it is fixed to the *Zygoma**.

The ſuperior *Inciſorius Minor* has its fixed adherences at the ſockets of the firſt inciſory teeth, and

* See Santorini obſerv. anatom. Venet. 1724.

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terminates interiorly at the ſuperior lip, which it depreſſes with its congenerate muſcle, by bringing it into contact with the gums.

Another muſcle alſo taken for a depreſſor of this lip is the *Triangularis*, which has its fixed adheſions externally at the baſe of the inferior jaw, and loſes itſelf at the joining of the lips.

The inferior lip is raiſed by the two ſmall inferior inciſors, which have their fixed adheſion at the ſockets of the firſt inciſory teeth, and terminate interiorly in the inferior lip.

To theſe muſcles we may add the *Canine*, which have their fixed adheſion in the *Foſſa Maxillaris* above the ſockets of the canine teeth, and terminate at the joining of the lips.

The inferior lip is depreſſed by the *Muſculus Quadratus*, which has its fixed adheſions at the anterior part of the inferior jaw, at the ſides of the *Symphyſis*, and in the *Symphyſis* itſelf, and terminates in almoſt all the extent of that lip.

The *Zygomatics* have their fixed adherence on each ſide at the joining of the cheek-bone with the temporal *Apophyſis*, and deſcending obliquely terminate in the joining of the lips. Theſe muſcles ſeparate the corners of the lips from each other when they act at the ſame time, and only move one of them when they act ſeparately.

The *Buccinators* have their fixed adheſions on each ſide, not only along the ſockets of the molary teeth of both jaws, but alſo at a ligament placed behind, which adheres to both jaws, and terminate at the joinings of the lips immediately behind the muſculus orbicularius. The buccinators act principally by preſſing the aliments in maſtication.

The *Orbicular Muſcle* appears only to be a pretty broad plane of fleſhy fibres, which covers the whole of the lips, and runs round all the mouth: but when it is examined with attention, we find it compoſed

poſed of two portions, whoſe fibres croſs each other at the corners of the lips, which has laid a foundation for dividing this muſcle into the *Semi-orbicularis Superior*, and the *Semi-orbicularis Inferior*.

The orbicular being ſeconded by the inciſores minores of both jaws, cloſes the mouth exactly.

The *Cutaneous* are very broad and ſlender muſcles, which cover the anterior and lateral parts of the neck, having ſome fixed adheſions along the clavicles, and even advancing a little over the *Pectoralis Majoris* and over the *Deltoides*. The fleſhy fibres of theſe muſcles croſs each other at the foot of the *Symphyſis* of the chin, where they have ſome adheſions, as well as at the external lip of the baſe of the jaw-bone, and generally loſe themſelves in the triangular muſcles: ſome of them advance to the maſſeter muſcles, and are continued all along the face, where they become aponeurotic. On account of theſe aponeurotic expanſions, ſome think that theſe muſcles have a ſhare in the different grimaces of the face, and have therefore placed them amongſt thoſe of the lips.

Of the Muſcles of the inferior Jaw.

The articulation of the inferior jaw with the temporal bones, permits it not only to be depreſſed and raiſed, but alſo to move forwards, backwards, and ſideways. Theſe motions are performed by the action of ſeveral muſcles, of which there are generally reckoned ten, five on each ſide, namely, two which depreſs it, called *Diagaſtric*, ſix which raiſe it, called *Crotaphites Maſſeters* and internal *Pterygoideans*, and two which move it forwards, called the external *Pterygoideans*: theſe laſt may alſo by their alternate action move the jaw obliquely ſideways, that is to ſay, one of them acting, turns the chin to the oppoſite ſide.

I ſhall here ſay nothing of the *Cutaneous* muſcles, which the ancients looked upon as depreſſors of the jaw, becauſe I have already mentioned them.

The *Digaſtric*, ſo called becauſe it has two bellies, has its fixed adheſions in the maſtoidean groove, and terminates in the inequalities found interiorly at the foot of the ſymphyſis of the chin.

This muſcle forms a flexure in its cours, and the tendon between its fleſhy portions adheres to the lateral portion of the *Os hyoides* by a kind of aponeurotic ligament. This tendon is as it were embraced by a muſcle of the *Os hyoides*, called *Stylo-ceratohyoidean*.

This muſcle, beſides its uſe in depreſſing the jaw, is alſo ſubſervient to deglutition; but for this purpoſe, 'tis neceſſary the elevators of the jaw ſhould be in a ſtate of contraction.

The crotaphite has its fixed adheſions at the lateral and inferior parts of the coronal, almoſt in the whole inferior part of the parietal, in the cellular portion of the temporal, the external ſurface of the branch or wing of the ſphenoide, and it terminates by a ſtrong tendon at the *coronoide* apophyſis, which it embraces every where.

This muſcle alſo adheres to the ſmall portion of the pericranium, which covers it, and is intimately united with the zygomatic arch, and this portion of the pericranium is fortified by the aponeurotic capſula before-mentioned.

The fibres of this muſcle are diſpoſed in rays, running from the center to the circumference. 'Tis to be obſerved, that its internal ſurface is fleſhy, and its external aponeurotic.

Experience has often convinced us that we may, without danger, cut the fibres of this muſcle acroſs, as well in the ſuperior as in the middle part, and even cut off a portion of them when neceſſity requires it.

The

The maſſeter is compoſed of two planes, or conſiderable portions, which croſs each other: the moſt external has its fixed adheſions at the inferior edge of the cheek-bone, and running a little obliquely backwards, terminates in the inequalities of the external ſurface of the angle of the jaw-bone. The other portion, or the internal plan, has its fixed adheſions along the inferior edge of the *zygomatic Arch*, and running a little obliquely forwards, terminates alſo in the external ſurface of the jaw-bone, immediately below the *coronoide* apophyſis.

The internal *Pterygoidean* called *Pterygoideus Major*, has its fixed adheſions in the pterygoidean foſſa, and runs a little obliquely forwards towards the angle of the inferior jaw, where it terminates in the irregularities of its internal ſurface.

The *external Pterygoidean* called *minor*, has its fixed adheſions externally at the external wing of the pterigoide apophyſis, as well as in the portion of the maxillary bone which is joined to it: it is alſo fixed to the root of the wing of the ſphenoide, whence running a little from before backwards, and almoſt tranſverſely to the condyle of the jaw, it terminates in a ſmall depreſſor which is immediately below that eminence, and even advances a little over the capſulary ligament of the articulation.

Of the Muſcles of the Os Hyoides.

The *Os Hyoides*, as I have before obſerved, is ſituated above the larynx, to which it is fixed as well as to the root of the tongue: it has nine muſcles to perform its motions. 'Tis commonly ſaid, that 'tis moved directly upwards by the two *Genio-hyoideans* and the *Mylo-hyoidean*, and obliquely by the two *Stylo-cerate-hyoideans*, that it is drawn directly downwards by the two *Sterno-hyoideans*, and obliquely by the *cerato-hyoideans*. But if we advert

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to the particular connections of this bone, as well with the root of the tongue as with the larynx, we will perceive that it has only two principal motions, to the performance of which all these different muscles are destin'd, namely, to raise and depress it for deglutition, that is to say, to make it follow the motions of the tongue and larynx during this function. I shall say nothing of the particular uses ascribed to some of these muscles.

The *Mylo-hyoidean* is a broad and pretty slender muscle composed of two portions, which are united with each other by a middle tendon: it has its fixed adhesions on each side, along the internal surface of the inferior jaw-bone, advancing to its symphysis, and terminating at the superior part of the base of the *Os hyoides*.

The *Genio-hyoidean* has its fixed adhesions at the inequalities found at the sides of the *Symphysis* of the chin, above the adhesions of the digastric muscle, and terminates at the superior part of the base of the *Os hyoides*, immediately behind the *Mylo-hyoidean*.

The stylo-cerato-hyoidean is fixed to the inferior extremity of the styloide apophysis, and terminates at the *Os hyoides*, in the union of its base with its horns.

The fleshy fibres of this muscle are most frequently removed on the side of the hyoide bone, in order to embrace the middle tendon of the digastric.

The *Sterno-hyoidean*, called *Sterno-cleido-hyoidean*, is fixed below to the superior and internal part of the *Sternum*, and to that of the *Clavicle*, and terminates above at the inferior part of the base of the *Os hyoides*.

The *Coraco-hyoidean*, also called the *Crosto-hyoidean* and *Omo-hyoidean*, is fixed below to the superior side of the omoplata, and terminates in the inferior

and lateral part of the baſe of the *Os hyoides*. This muſcle has a tendon in its middle, which renders it *Digaſtric*.

Of the Muſcles of the Tongue.

Every one knows that the tongue is capable of a great many motions, which are performed not only by fleſhy fibres peculiar to the tongue, but alſo by muſcles which terminate in its ſubſtance and compoſe a part of it, as I ſhall afterwards ſhew. We reckon ſix muſcles in the tongue, three on each ſide, namely, the *Genio-gloſſus*, the *Baſio-gloſſus*, and the *Stylo-gloſſus*.

The *Genio-gloſſals* have their fixed adheſions internally at the ſymphyſis of the chin, immediately above the *Genio-hyoideans*, and terminate all along the inferior part of the tongue. Some aſſert, that the uſe of theſe muſcles is to draw the tongue forward: but if we conſider that the fibres of theſe muſcles are generally diffus'd like rays, forwards, upwards, and backwards, in the thickneſs of the tongue, we ſhall find that they may not only draw the tongue out of the mouth by their poſterior fibres, which run to its baſe, but alſo draw it inwards by their anterior and crooked fibres which go to its point.

The *Baſio-gloſſals* have their fixed adheſion not only at the baſe of the *Os hyoides*, but alſo at a portion of its horns, and even at the cartilages, which riſe upon the junction of the horns with the baſe, and terminate along the inferior part of the tongue to draw it backwards. Some call theſe the *Hyo-gloſſals*, and others, who make three pairs of them on account of their different adheſions, call them *Baſio-gloſſals*, *Cerato-gloſſals*, and *Chondro-gloſſals*.

The *Stylo-gloſſals* have their fixed adheſions at the upper part of the *Styloide apophyſis*, and terminate in the inferior and lateral parts of the tongue to carry

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it ſideways, when they act ſeparately, and to draw it inwards when both act together. Each of theſe two muſcles furniſhes a ſmall aponeurotic ligament, which terminates in the internal ſurface of the angle of the inferior jaw-bone.

Some add a fourth pair of muſcles to the tongue, and call them *Mylo-gloſſals:* theſe are ſmall fleſhy plans, ſituated tranſverſely above the *Mylo-hyoideans*, fixed in one part along the lateral parts of the inferior jaw, and on the other to the ſides of the tongue. But often theſe muſcles do not appear.

Of the Muſcles of the Larynx.

The *Larynx* is the ſuperior part of a duct called the *Trachea Arteria*, which communicates with the lungs: it is compoſed of ſeveral parts, the principal of which are cartilages and muſcles. The cartilages are five in number, namely, the *Thyroide*, the *Crycoide*, the two *Arytenoides*, and the *Epiglottis*.

The *Thyroide* is the firſt, and at the ſame time the moſt conſiderable of theſe cartilages: it is ſituated anteriorly, and forms that eminence in the upper part of the neck called *Pomum Adami*. Its external ſurface is convex, and its internal concave. Its figure is nearly ſquare, and its angles, which are ſomewhat lengthened, are called horns: the ſuperior of theſe are joined with thoſe of the *Os hyoides*, and the inferior to the cartilage called *Cricoide* or annular, on account of its figure. It is placed under the *Thyroide*, and ſerves as a ſupport to it, as well as to the two *Arytenoides*. Theſe laſt, by their union, form a kind of beak of an ear, tho' their figure in particular is nearly pyramidal. They are placed on the ſuperior edge of the *Cricoide*, with which they have an articulation which permits them to move in different directions. Between the *Arytenoide* cartilages we diſcover the *Glottis*, or orifice of the *Trachea Arteria*. The fifth is called *Epiglottis*,

which is a pretty long cartilage, ſituated at the internal and ſuperior part of the *Thyroide*, where it is fixed as well as to the root of the tongue, by a ligament which advances to the extremity of this cartilage.

The muſcles of the larynx are diſtinguiſhed into common and proper: the common are thoſe deſtin'd to move the whole body of the *Larynx*, and the proper are ſubſervient to the particular motions of its cartilages, except the *Cricoide*, which has no motion.

The common muſcles are divided into thoſe which raiſe and thoſe which depreſs it: the firſt are the two *Hyo-thyroideans*; they have their fixed adheſions in the body of the *Os hyoides*, and terminate externally at the lateral parts of the *Thyroide* cartilage. The ſecond are the two *Sterno-thyroideans*, commonly called the *bronchial* muſcles, and by ſome *Sterno-cleydo-broncho-circo-thyroideans*. They have their fix'd adheſions at the ſuperior and internal part of the *Sternum* and at the *Clavicles*, and terminate at the *Thyroide* cartilage, immediately above the preceding.

The proper muſcles of the *Larynx* are diſtinguiſhed into thoſe which move the thyroide cartilage, thoſe which move the *Arytenoides*, and thoſe which move the epiglottis.

The *thyroide* cartilage has four muſcles, namely, two which dilate and two which contract it: the firſt are called the anterior and external *Crico-thyroideans*. They have their fixed adheſions at the anterior part of the cricoide cartilage, and terminate externally at the inferior and lateral part of the thyroide. The ſecond, called the anterior and internal *Crico-thyroideans*, have alſo their fixed adheſions at the anterior part of the *Cricoide*, and terminate internally at the inferior and lateral parts of the *Thyroide*.

The muſcles of the *arytenoide* cartilages are diſtinguiſhed into thoſe which ſeparate them, and thoſe which bring them near each other, or as we commonly ſay, thoſe which open and thoſe which ſhut the *Epiglottis*. The firſt are ſix in number, the poſterior *Crico-arytenoide*, which has its fixed adheſion at the poſterior part of the *Cricoide*, and terminates at the *arytenoide* cartilage; the lateral *Cricoide Arytenoidean*, which has alſo its fixed adheſion ſomewhat laterally at the *Cricoide*, and terminates at the *arytenoide* cartilage; and the *Thyro-arytenoidean*, which has its fixed adheſion in the internal ſurface of the *Thyroide*, and terminates at the *Arytenoide*.

As for the muſcles which bring the *arytenoide* cartilages near each other, the ancients knew only one of them, which they called *ary-arytenoidean*. The moderns admit of three, namely, two which they call the oblique *arytenoideans*, which have their fixed adheſion at the ſuperior and ſomewhat lateral parts of the *Cricoide*, and which, after croſſing each other obliquely, terminate at the *Arytenoides*. The third, called the tranſverſe *Arytenoidean*, is fixed by the extremities of its fibres to both the *arytenoide* cartilages. This laſt is covered by the two others.

The muſcles of the epiglottis are three in number, namely, two which depreſs, and one which raiſes it. The firſt are called *Ary-epiglottideans*, on account of their adheſion to the *arytenoide* cartilages and the *epiglottis*. And the third, or the *elevator*, is known by the name of *Hyo-epiglottidian*, becauſe it has its fixed adheſion in the *Os hyoides*, and terminates at the *Epiglottis*. Theſe three muſcles are more perceivable in an ox than in a man.

Of the Muſcles of the Pharynx.

The *Pharynx* is a kind of muſcular ſack which lines the whole inferior part of the mouth, and forms the beginning of a canal, to which it ſerves

as an arch. This canal, called the *Œſophagus*, terminates in the ſtomach, as I ſhall afterwards ſhew.

The *Pharynx* has ſeveral muſcles which only ſerve for the compoſition of its ſides, but of which ſome however ſeem to dilate them, at the ſame time that they ſtrengthen their ſituation by their adheſions to the neighbouring bones; and the particular uſe of the reſt is to contract the pharynx, in order to facilitate the entry of the aliments into the *Œſophagus*.

The ancients have only aſcribed ſeven muſcles to the *Pharynx*, namely, three pair to dilate it, and only one muſcle to contract it: this laſt is called *Œſophagian*, by ſome called *Pharyngo-thyroidean*, which adheres on each ſide by the extremities of its fibres to the wings of the *thyroide* cartilage, advancing a little over the external ſurface of the ſame cartilage: and by the reſt of the extent of theſe ſame fibres, covers the poſterior and inferior part of the *Pharynx*, to which it ſerves as a *Sphincter* by their contraction.

The other muſcles are called *Cephalo-pharyngeans*, *Stylo-pharyngeans*, and *Spheno-pharyngeans*.

The *Cephalo-pharyngeans* have their fixed adheſion at the inequalities obſervable on the anterior *Apophyſis* of the *Occipital* near its *Condyles*, and they terminate at the poſterior part of the pharynx.

The *Stylo-pharyngeans* have their fixed adheſion in the middle of the *Styloide Apophyſes*, and terminate in the *Pharynx*.

The *Spheno-pharyngeans* have their fixed adheſion in the *Spinal Apophyſes* of the *Sphenoide*, and alſo in the cartilaginous portion of the *Euſtachian Tube*, and terminate in the *Pharynx*.

Valſalva calls theſe muſcles *Spheno-ſalpingo-pharingeans*, on account of their adheſion to the euſtachian tube.

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The moderns have obſerved, that beſides theſe muſcles, the pharynx alſo receives from different parts to which it is fixed ſmall fleſhy bands, more or leſs conſiderable, which alſo concur, as well as the preceding muſcles, to the compoſition of its ſides, and even advance moſt commonly to the poſterior part of the *Pharynx*, where by their union with the above-mentioned muſcles they form a tendinous ligament, which extends all along its middle part, which has induced ſome authors to look upon theſe ſmall fleſhy bands as ſo many particular muſcles, to which they have given various names, drawn from their adheſions; and comprehending the muſcles already known, along with theſe new ones, they have diſtinguiſhed them into three claſſes.

The firſt comprehends thoſe which come from the ſide of the mouth, or from the inferior jaw: the ſecond, thoſe which come from the ſide of the baſe of the *Cranium*, and under the third are included the muſcles which come from the ſide of the *Larynx*.

The muſcles of the firſt claſs are the *Gloſſo-pharyngeans*, the *Periſtaphylo-pharyngeans*, the *Genio-pharyngeans*, and the *Mylo-pharyngeans*.

The *Gloſſo-pharyngeans* are ſmall fleſhy muſcles, detach'd from the lateral parts of the tongue, and terminate in the *Pharynx*.

The *Periſtaphylo-pharyngeans* are two ſmall muſcles which have their fixed adheſion in the bones of the palate, betwixt the *Uvula* and the inferior extremity of the internal wing of the *Pterygoide-apophyſes*, and run obliquely backwards to terminate in the *Pharynx*.

The *Genio-pharyngeans* have their fixed adheſion at the *Symphyſis* of the chin at the ſide of the *Genio-gloſſals*, and terminate in the pharynx.

The *Mylo-pharyngeans* have their fixed adheſions in the internal ſurface of the baſe of the inferior jaw-bone near the molary teeth, and terminate in the pharynx. Theſe laſt muſcles are not found in all ſubjects.

The muſcles of the ſecond claſs are the *Cephalo-pharyngeans*, the *Stylo-pharyngeans*, the *Spheno-pharyngeans*, the *Petro-pharyngeans*, and the *Pterygo-pharyngeans*.

I have already deſcribed the three firſt of theſe muſcles, and I now proceed to ſay ſomething of the two laſt.

The *Petro-pharyngeans* have their fixed adheſions at the lower part of the *Stony Apophyſes*: the *Pterygo-pharyngeans* are fixed to the edge of the internal wing of the *Pterygoide Apophyſes*; theſe muſcles are united with thoſe called the *Sphens-pharyngeans*, and all the three on both ſides run obliquely backwards, in order to terminate in the *Pharynx*.

As for the muſcles of the third claſs, we reckon three pair of them, namely, the *Hyo-pharyngeans*, the *Thyro-pharyngeans*, and the *Crico-pharyngeans*. The firſt comprehends ſome fleſhy fibres, which run from the *Os hyoides* to terminate in the *Pharynx*; ſome of theſe fibres riſe from the baſe of this bone, and others from its horns both large and ſmall, which has laid a foundation for dividing theſe muſcles into three other pairs, called the *Baſio-pharyngeans*, the *Cerato-pharyngei majores*, and the *Cerato-pharyngei minores*.

The *Thyro-pharyngeans* compoſe the *œſophagian* muſcle, which is ſtrengthened by the *Hyo-pharyngeans*, and the *Crico-pharyngeans*, which are fleſhy portions ariſing from the *Cricoide* cartilage.

Some moderns *, adverting to the particular direction of the muſcles of the pharynx which run to its

* See Albini hiſtor. muſcular. Lugd. Batav. 1734.

poſterior

poſterior part, and form a tendinous line all along it, have alſo thought them proper to contract the cavity of the pharynx, by bringing its ſides nearer to each other; which has induced them to aſcribe to the pharynx three *Sphincters*, diſtinguiſhed from their ſituation into *ſuperior*, *middle*, and *inferior*: the ſuperior *Sphincter* is formed by the *Genio-pharyngeans*, the *Mylo-pharyngeans*, the *Gloſſo-pharyngeans*, the *Pterrigo-pharyngeans*, and the *Petro-pharyngeans*.

The middle ſphincter is formed by the *Hyo-pharyngeans* and the *Cephalo-pharyngeans*.

The inferior ſphincter is formed by the *Pharyngo-thyroidean*, of which ſome make two muſcles, which they call *Thyro-pharyngeans* and *Crico-pharyngeans*.

In order the better to diſcover the muſcles of the *Pharynx*, we muſt fill it with flax or cotton, to give it a proper convexity, and render its ſides firm.

Of the Muſcles of the Partition of the Palate, and of the Uvula.

The partition or veil of the palate is the poſterior and flexible part of that arch, and is almoſt entirely fleſhy. It is interſperſed with ſeveral glands, and covered next the mouth and noſe with membranes, which line theſe two cavities: this partition is cloſely adherent to the poſterior edge of the bones of the palate, and is as it were fluctuating at the poſterior part of the mouth, where it terminates, by forming two arches, ſeparated from each other by the Uvula, which is a continuation of it. Theſe arches are formed each of two pillars, of which two are anterior and two poſterior: the former are fixed to the tongue, and the latter to the pharynx.

Some people commonly confound the muſcles of this partition with thoſe of the *Uvula*, tho' this laſt has quite diſtinct muſcles. The action of the muſcles of the partition renders it capable of two motions,

tions, that is to ſay, of being elevated and depreſſed. The partition in riſing is applied to the apertures which communicate between the noſe and bottom of the mouth, in order to ſhut them; and when it is depreſſed, it is ſeparated from theſe apertures. The muſcles which elevate the partition are the internal *Periſtaphylins*, the *Pharyngo-ſtaphylins*, and the *Thyro-ſtaphylins:* thoſe which depreſs it are the external *Periſtaphylins* and the *Gloſſo-ſtaphylins:* the muſcles which move the uvula independently of the partition, are the *Palato-ſtaphylins* and the *Cerato-ſtaphylins.*

The internal *Periſtaphylines*, called the *Petro-ſalpingo-ſtaphylins*, have their fixed adheſion on each ſide in the bony and cartilaginous parts of the *Euſtachian* tube, and terminate by ſpreading their fibres on the ſuperior ſurface of the partition.

The *Pharyngo-ſtaphylins* riſe from the pharynx, of which they ſeem to be a production, and terminate at the partition, advancing as far as the uvula. Theſe muſcles form the thickneſs of the poſterior pillars of the partition: they are accompanied with the *Thyro-ſtaphylins*, which have their fixed adheſion in the *thyroide* cartilage.

The *external Periſtaphylins*, called the *Spheno-ſalpingo-ſtaphylins*, have their fixed adheſion at the *Sphinoide*, joining the bony partition of the *Euſtachian* tube, and the membranous portion of this tube go to the internal wing of each pterygoide apophyſis, to which they are fixed by ſome fibres, and continuing along that wing, paſs their tendon behind the ſmall beak or crotchet which terminates it, as round a pully, and at laſt ſpread themſelves over all the inferior ſurface of the partition. *Valſalva* looks upon the portion of theſe muſcles, which is fixed on one ſide to the membranous part of the tube, and on the other to the internal wing of the pterygoide apophyſis, as a muſcle which dilates the tube.

The *Gloſſo-ſtaphylins* are fixed in one part to the inferior ſides of the root of the tongue, and in the other to the partition, where they terminate in advancing to the uvula. Theſe muſcles form the thickneſs of the anterior pillars of the uvula.

The *Palato-ſtaphylins*, alſo called *Staphylins* or *Epiſtaphylins*, are two ſmall muſcles, in the form of fleſhy cords united together. They have their fixed adheſion at the poſterior edge of the bones of the palate, near the ſuture which joins theſe two bones, and terminate in the uvula, advancing to its point. Mr. *Morgagni* comprehends theſe two muſcles under one, which he calls *Azygos*. Theſe two muſcles in acting ſeem to ſhorten the uvula. They are aſſiſted by other two ſmall muſcles placed at the ſides, and called *Cerato-ſtaphylins* or lateral *Epiſtaphylins*. They have their fixed adheſion at the bony beak which terminates the internal wing of each *pterygoide* apophyſis, and lying on the ſuperior ſurface of the partition, they at laſt terminate in the uvula.

Of the Muſcles of the Head.

The head moves in different manners, for beſides its moving forward and backward, it can alſo make conſiderable motions both to the right and left ſides. The flexion and extenſion of the head are perform'd, as I have elſewhere ſaid, by the articulation of the occipital with the firſt vertebra of the neck; and its motions to the ſides depend on the articulation of the firſt with the ſecond vertebra, by means of its *Odontoide apophyſis*, round which the firſt vertebra moves ſemicircularly, and carries the head along with it in its motions.

The muſcles which carry the head forwards, that is to ſay, which bend it, are eight in number, four on each ſide, namely, the *Sterno-cleido-maſtoidean*, the *Rectus major anterior*, the *Rectus minor*, and the *Rectus lateralis*. The muſcles which carry the head back-

backwards, that is, which extend it, are twelve in number, ſix on each ſide, namely, the *Splinius*, the *Complexus major*, the *Complexus minor*, the *Rectus major poſterior*, the *Rectus minor poſterior*, and the *Obliquus minor*.

The muſcles deſtin'd for the ſemi-circular motions of the head, are the two *Obliqui majores*.

The *Sterno-cleido-maſtoideans*, called alſo the anterior *maſtoideans*, have their fixed adheſion on each ſide in the upper part of the ſternum, as alſo in the ſuperior and internal part of the clavicle, by two tendinous principles, and running a little obliquely backwards, terminate by a pretty ſtrong tendon at the maſtoide apophyſis, and continue by way of aponeuroſis to the occipital.

The *Recti majores anteriores* are fixed anteriorly to the tranſverſe apophyſes of the ſixth, fifth, fourth, and third vertebræ of the neck, and terminate at the *Occipital* at the ſide of the *Recti majores*.

The *Recti laterales*, called alſo *Tranſverſales anteriores*, have their fixed adheſion anteriorly at the tranſverſe apophyſes of the firſt vertebra of the neck, and terminate at the part where the occipital is joined to the temporal bones near their maſtoide apophyſes.

Each *ſplenius* muſcle is compoſed of two portions, one of which belongs to the head, and another to the neck: theſe two portions, which are cloſely united with each other at their inferior parts, have their fixed adheſions at the ſpines of the four or five ſuperior vertebræ of the back, and of the three or four inferior vertebræ of the neck, and terminate differently. Thus the inferior portion which belongs to the neck, goes to the tranſverſe apophyſes of the firſt and ſecond vertebræ of the neck, and the ſuperior portion to the lateral parts of the occipital, advancing to the maſtoide apophyſes, for which reaſon

reaſon theſe muſcles are alſo called *Maſtoidei poſteriores.*

The *Complexi majores* have their fixed adheſion at the tranſverſe apophyſes of the two or three ſuperior vertebræ of the back, and the ſix inferior of the neck, and terminate in the middle of the occipital, immediately below its tranſverſe apophyſis, at the ſide of the two ſplenij which they croſs.

The *Splenij minores*, called alſo the lateral maſtoideans, are two ſmall, ſtreight, and denticulated muſcles, which have their fixed adheſion at the tranſverſe apophyſes of the ſix inferior vertebræ of the neck, and terminate immediately behind the maſtoide apophyſes. Theſe muſcles have ſome reſemblance with the *Complexi*, for which reaſon they are called *Complexi minores.* Moſt anatomiſts confound theſe muſcles with thoſe called the *Longi dorſales.*

The *Recti majores poſteriores* have their fixed adheſion at the ſpine of the ſecond vertebra of the neck, and running a little obliquely outwards, terminate at the occipital below the *Complexi majores.*

The *Recti minores poſteriores* have their fixed adheſion at a ſmall eminence obſerved poſteriorly in the middle of the firſt vertebra of the neck, and terminate immediately above the great *Foramen occipitale.*

The *Obliqui minores*, called alſo *Obliqui ſuperiores*, have their fixed adheſion at the extremity of the tranſverſe apophyſes of the firſt vertebra of the neck, and terminate at the lateral and inferior parts of the occipital.

The *Obliqui majores*, called *Obliqui inferiores*, have their fixed adheſion at the ſpine of the ſecond vertebra of the neck, and terminate at the tranſverſe apophyſes of the firſt.

The

The eminences of the *Occipital*, called *Condyles*, by which the articulation of the head with the firſt vertebra of the neck, being ſituated at the inferior and ſomewhat poſterior part of the head, the weight of this part muſt neceſſarily draw it forward; and there is reaſon to believe, that 'tis to moderate this too great diſpoſition of the head to fall forwards, that its poſterior muſcles are more numerous than its anterior.

We ſometimes find ſmall muſcles placed at the ſide of the *Recti minores*, both anterior and poſterior. Theſe are called *ſupernumerary* muſcles, and have the ſame uſes with thoſe muſcles to which they are ſupernumerary.

'Tis to be obſerved, that the motions of flexion and extenſion which the head performs by the articulation of the occipital with the firſt vertebra of the neck, and thoſe which it performs ſideways by means of the *Odontoide apophyſis* of the ſecond, are very ſmall, as we may obſerve in a carcaſs juſt ſtript of its fleſh. If then we bend our head much forwards, backwards, or ſideways, we may eaſily perceive that theſe motions depend much leſs on theſe particular articulations, than on thoſe which all the vertebræ of the neck have with each other, and which permit the neck not only to move forwards, backwards, and ſemi-circularly on the ſides, but alſo to make lateral inflexions, and to give theſe different motions a great deal of extent.

The head has therefore two kinds of motions, namely, ſuch as are proper, and in which the neck has no ſhare, and others which it performs in conjunction with the neck. Theſe laſt are by the ancients called the common motions of the head. There are even certain motions of the neck, in which the head is carried along without moving, and by making as it were but one piece with the firſt vertebra.

This

This happens in its lateral inflexions to the right and left.

'Tis to be obſerved, that all the muſcles aſcribed to the head, are not in contraction during its proper motions: thus, for example, it is probable that in flexion, only the *Recti majores anteriores*, the *Recti minores*, and the *Recti laterales*, are in a ſtate of contraction. In extenſion, the *Recti majores*, the *Recti minores poſteriores*, and the *Obliqui minores*, are the only muſcles in contraction. And in the ſemi-circular motions, the two *Obliqui majores* are put alternately in a ſtate of contraction, whereas for the common motions of the head, not only all the muſcles aſcribed to the head are put into a ſtate of contraction, but alſo thoſe of the neck, which are deſtin'd for the ſame motions: thus, for example, in the common flexion of the head, not only all its flexor muſcles act, but alſo thoſe of the neck deſtin'd to bend it, and the ſame holds true with reſpect to its extenſion.

As for the ſemi-circular motions of the head to the right and left, when theſe are common, they are performed not only by the muſcles of the neck deſtin'd for its ſemi-rotations, but alſo by the two *Obliqui majores*, which have alſo for their auxiliaries the *ſplenius* muſcle of the ſame ſide, and the *Sterno-maſtoidean* of the oppoſite ſide. Thus, for example, if we intend to turn the head to the right, it is the left *Sterno-maſtoidean* which acts in conjunction with the *Splenius* and the *Obliquus major* of the right ſide, and the ſame muſcles of the oppoſite ſide will act, when we turn the head ſemi-circularly to the left.

ARTI-

ARTICLE II.

Of the Muſcles of the Trunk.

AMONG the muſcles of the trunk we may reckon thoſe of the neck, the back, the loins, and thoſe ſubſervient to reſpiration: to theſe we ought alſo to add thoſe of the *Coccyx*, *Abdomen*, *Teſticles*, *Penis*, *Clitoris*, and *Anus*. The reader will find a deſcription of the muſcles of the *Abdomen*, and thoſe mentioned after them, in the *Splanchnology*.

REMARK.

The motions of the neck, as well as thoſe of the back and loins, depend principally on the action of certain muſcles, which having no other adheſion than to the vertebræ, have for that reaſon been called vertebral muſcles. *Steno* has, from their direction, divided them into ſtreight and oblique: the firſt run from a ſpinal or from a tranſverſe apophyſis to the eminence of the ſame kind above it, which has induced that author to divide theſe muſcles into middle and lateral.

The *oblique vertebral* muſcles have been diſtinguiſhed into two claſſes. The firſt comprehends thoſe which go from the tranſverſe to the ſpinal apophyſes: they are called *Tranſverſo-ſpinal*, or *Convergent*; and of the firſt, ſome inſtead of terminating in the ſpinal apophyſes, run to the body of the vertebra, which is above. Under the ſecond claſs are included, thoſe muſcles which go from the ſpinal to the tranſverſe apophyſes. Theſe laſt are called *Spino tranſverſe* or *Divergent*.

Of the Muſcles of the Neck.

The neck performs ſeveral different motions, for beſides its flexion and extenſion, it can alſo make lateral inflexions, that is, incline itſelf to each ſide, and

and laſtly, turn a little obliquely to the right and left, in the manner of a pivot. All theſe motions, which conſtantly appear accompanied with thoſe of the head, if we except the lateral inflexions in which the head is only carried along, as I have before obſerved, are performed by ſeveral muſcles, which are generally reckoned to be eight in number, namely, four flexors and as many extenſors, two on each ſide. Among the flexors we count the two *Scaleni*, and thoſe called the *Flexores longi Collis*; and among the extenſors, the two ſpinal and the two tranſverſe muſcles.

The *Flexores longi* have their fixed adheſion in the body of the three ſuperior vertebræ of the back, and continuing along the neck, are alſo fixed to its vertebræ, and at laſt terminate in the eminence obſervable anteriorly in the middle of the firſt.

We may diſtinguiſh each of theſe muſcles into two portions, with reſpect to the different direction of the ſeveral ſmall muſcles of which they ſeem to be compoſed. Thoſe of the ſuperior portion have their fixed adheſion at the tranſverſe apophyſes of the ſixth, fifth, fourth, third and ſecond vertebræ of the neck, and running obliquely from below upwards, terminate at the anterior eminence of the firſt, and the bodies of the three vertebræ below.

The ſmall muſcles which compoſe the inferior portion, have their fixed adheſion at the lateral parts of the bodies of the three firſt vertebræ of the back, and of the laſt of the neck, and running a little obliquely outwards, terminate at the root of the tranſverſe apophyſes of all the vertebræ of the neck, except that of the firſt and laſt.

The *Muſculus ſcalenus* is compoſed of two portions or branches, one anterior and another poſterior: the anterior has its fixed adheſion in the external ſurface of the firſt rib, near its cartilaginous portion; and

the poſterior has alſo its fixed adheſion at the ſame rib: both of them terminate at the tranſverſe apophyſes of the vertebræ of the neck. Theſe two portions leave a diſtance between them, for the paſſage of the artery and nerves which go to the arm.

The poſterior portion of this muſcle is accompanied with two others, one of which has its fixed adheſion in the ſecond, and the other in the third rib. They alſo terminate in the tranſverſe apophyſes of the vertebræ of the neck.

The *ſpinal* muſcle, called alſo the tranſverſe ſpinal of the neck, is compoſed of ſeveral oblique vertebral muſcles, which have their fixed adheſions in the tranſverſe apophyſes of the five or ſix ſuperior vertebræ of the back, and the inferior of the neck, and terminate in the ſpines of the vertebræ of the neck, but principally in that of the ſecond. Moſt of theſe muſcles are confounded with the *Spinales dorſi*.

The *Tranſverſalis*, called the *Spino-tranſverſalis*, is only the inferior portion of the *Splenius* muſcle. In a word, this inferior portion having its fixed adheſions in the ſpines of the four ſuperior vertebræ of the back, and terminating in the tranſverſe apophyſes of the ſuperior vertebræ of the neck, ſeems neceſſarily to be ſubſervient to its extenſion.

The moderns add ſome other muſcles to thoſe I have now deſcribed, and look upon them as the auxiliary muſcles of the extenſors of the neck. The firſt of theſe muſcles are called *Tranſverſe*. There are two of them on each ſide, which are diſtinguiſhed into the *Tranſverſi majores* and *minores*.

The *Tranſverſus major* is a long and ſlender muſcle, ſituated between the *Complexus major* and *minor*, along the tranſverſe apophyſes of the vertebræ of the neck, and of the five or ſix ſuperior vertebræ of the back. It is compoſed of ſeveral ſmall muſcles,

which from one or more tranſverſe apophyſes, terminate at thoſe of the vertebra which is immediately above, or at the tranſverſe apophyſes of the moſt diſtant vertebræ.

The *Tranſverſus minor* is ſituated at the ſide of the *major*, from which it does not ſeem to differ, except with reſpect to its bulk. It is generally looked upon as a portion of the *Sacro-lumbaris*, and *Diemerbroeck* calls it *Cervicalis deſcendens*.

The ſecond auxiliary muſcles of the extenſors of the neck are called *Interſpinales* and *Intertranſverſales*, on account of their ſituation between the ſpinal apophyſes of the vertebræ of the neck, and the tranſverſe apophyſes of the ſame vertebræ. Theſe muſcles are very ſhort, reaching only from one vertebra to another, that is to ſay, to that which is immediately above, continuing thus from the firſt vertebra of the back to the ſecond of the neck.

As for the lateral inflexions of the neck, they are thought to depend on the action both of the flexor and extenſor muſcles of the neck, placed on that ſide on which theſe inflexions are made; and the *Sterno-maſtoidean* and *Splenius* of the oppoſite ſide, are looked upon as neceſſary to regulate by their extenſion that lateral inclination of the head, and afterwards to recover it by their contraction.

But beſides theſe lateral inflexions, the neck can alſo make half turns to the right and left, in the manner of a pivot, as I have before obſerved when ſpeaking of theſe motions of the head, when it performs them in conjunction with the neck; and beſides the muſcles which I have ſaid performed theſe motions, we ought to add the ſpinal muſcles of the neck, which act alternately.

Of the Muſcles of the Loins and Back.

Tho' theſe muſcles extend almoſt equally along the loins and back, and move at the ſame time, yet as the loins are more diſpoſed to motion than the back, on account of the particular articulation of the vertebræ which compoſe it, it is cuſtomary to aſcribe theſe muſcles rather to the loins than to the back.

The loins move forwards, backwards, and to each ſide.

We generally aſcribe this motion of the loins forwards, or their flexion, to the action of two muſcles, called the *Quadrati lumborum*, and to that of the ſmall Pſoas muſcles; and we look upon the *Muſculi recti* of the abdomen, as their auxiliaries. The extenſion is attributed not only to the action of the *Muſculi ſacri*, but alſo to that of the two *Sacro-lumbares*, the *Longo-dorſales*, the two *Demi-ſpinales*, and the two *Spinales dorſi*, to which we add a great number of ſmall muſcles which run along all the back and loins, and go not only to the neck, but alſo from the ſpinal apophyſis of one vertebra to that of the vertebra above it, and ſeveral others which do the ſame with reſpect to the tranſverſe apophyſes.

As for the motions which the loins perform towards the ſides, they are to be diſtinguiſhed into two kinds, namely, thoſe which are ſtreight, and thoſe which are oblique: thoſe which are ſtreight, called the lateral flexions of the loins, depend on the action both of the flexor and extenſor muſcles of the loins, placed on the ſide to which the lateral motion is perform'd. The oblique motions, called alſo the demi-rotations of the thorax, depend principally on the oblique muſcles of the abdomen, and on the oblique vertebral muſcles of the loins.

The *Quadratus lumborum*, called alſo *Lumbaris externus*, has its fixed adheſions at the internal lip of

the creſt of the *Os ileum*, from about its middle to its ſuperior part, adheres alſo to the *Os ſacrum*, and thence mounts up before the tranſverſe apophyſes of the vertebræ of the loins, to the extremities of which it is fixed by as many tendons, and terminates in the internal ſurface of the laſt of the falſe ribs, covering the ligament which fixes this rib to the firſt of theſe vertebræ.

The *Pſoas minor* is a pretty ſlender muſcle, whoſe fleſhy body is fixed to the tranſverſe apophyſis of the laſt vertebra of the back, and ſometimes to that of the firſt of the loins. It deſcends along one of the flexors of the thigh, called alſo *Pſoas*, and terminates by a flat tendon like an aponeuroſis in the ſpine or creſt of the pubis, where it unites with the *Os ileum*. This muſcle is not found in all ſubjects.

The *ſacro* or *ſpinal muſcle of the loins* is compoſed of ſeveral ſmall vertebral oblique muſcles, which run from the tranſverſe to the ſpinal apophyſes, for which reaſon it is alſo called the *Tranſverſo-ſpinal of the loins*. The moſt inferior of theſe muſcles are fixed to the ſuperior and lateral parts of the *Os ſacrum*, and to the poſterior and ſuperior ſpine of the *Oſſa ilea*, and the reſt to the tranſverſe apophyſes of the three inferior vertebræ of the loins, and terminate at the ſpines of theſe vertebræ, and at thoſe of the two others which are above them. This muſcle is concealed by the *Dorſalis longus*.

The *Sacro-lumbaris* has its fixed adheſion poſteriorly at the ſuperior and external part of the *Os ileum* and the *Os ſacrum*, by an aponeuroſis: it is alſo fixed to the tranſverſe apophyſes of the vertebræ of the loins, by fleſhy portions. It afterwards continues along the ribs, dividing itſelf into two portions or plans, the moſt external of which advances to the tranſverſe apophyſis of the laſt vertebra of the neck, furniſhing in its road ſome tendons, which

terminate obliquely from below upwards at the angles of the ribs. The interior plan ſeems to form a particular muſcle, which has its fixed adheſion at the tranſverſe apophyſes of the three or four inferior vertebræ of the neck, and whoſe tendons running obliquely from above downwards, croſs thoſe of the exterior plan, and terminate at the angles of the eight or nine inferior ribs. They who make a particular muſcle of this internal plan, look upon it as a muſcle of the neck, and call it *Tranſverſalis minor*, or *Cervicalis deſcendens*.

The muſcle called *Dorſalis longus* at three different places, namely, by a fleſhy portion at the poſterior and internal part of the *Os ileum*, by a pretty ſtrong aponeuroſis at the poſterior and ſuperior part of the ſame bone, and to the ſuperior ſpines of the *Os ſacrum*, and laſtly, at the ſpines of the four laſt vertebræ of the loins, and ſometimes of all the five, by tendinous bands. This muſcle alſo adheres by ſeveral fleſhy portions to the tranſverſe and oblique apophyſes of theſe vertebræ, and then aſcending along the back, they terminate poſteriorly by ſeveral fleſhy portions at the inferior and external part of the falſe ribs near their angles, and by other portions which are almoſt all tendinous, at the extremities of the tranſverſe apophyſes of the ſeven ſuperior vertebræ of the back.

This muſcle is confounded in its inferior part with the *Sacro-lumbaris*, and in its middle with the *Semi-ſpinalis*.

The *Semi-ſpinalis*, by ſome called the *Spinalis major dorſi*, has its fixed adheſions at the ſpine of the firſt vertebra of the loins, and at that of the twelfth, eleventh, and tenth vertebræ of the back, by ſo many ſmall tendons; and after having communicated with the *Longiſſimus dorſi*, terminates at the ſpines of the ſeventh, ſixth, fifth, fourth, third and ſecond vertebræ of the back, uniting partly with the

the vertebrals which the tendons of this muſcle cover.

The *Spinalis dorſi*, as well as the *Spinalis colli*, is compoſed of ſeveral ſmall vertebral oblique muſcles, which from the tranſverſe apophyſes of the vertebræ of the back, and the ſuperior of the loins, go to the ſpines of the vertebræ of the back which are above them. The uppermoſt of theſe muſcles goes from the tranſverſe apophyſis of the third vertebra of the back, to the ſpine of the firſt; and the undermoſt goes from the tranſverſe apophyſis of the third vertebra of the loins, to the ſpine of the laſt vertebra of the back. 'Tis to be obſerved, that of all theſe ſmall muſcles which compoſe the *Spinalis dorſi*, ſome go from one tranſverſe apophyſis to ſeveral ſpinal ones, and others from ſeveral tranſverſe apophyſes to one ſpinal. Some call this muſcle the *Tranſverſo-ſpinalis dorſi*.

Of the Muſcles of the Coccyx.

The coccyx has four muſcles, two on each ſide, one of which is anterior and the other poſterior. The firſt, called the *Iſchio-coccyngien*, has its fixed adheſions at the ſpine of the iſchium by a narrow beginning. The fibres of this muſcle ſeparate from each other in form of rays, to terminate at the lateral parts of the coccyx.

The ſecond, called the *Sacro-coccyngien*, has its fixed adheſions in the internal ſurface of the *Os ſacrum*, a little above the *Coccyx*. It alſo adheres to the adjacent ligaments, and terminates in the *Coccyx*. The uſe of theſe muſcles, is to prevent the inverſion of the *Coccyx*.

Of the Muſcles ſubſervient to Reſpiration.

Reſpiration comprehends thoſe two motions of the breaſt by which the air ſometimes enters into the lungs, and is at other times diſcharged from them. The firſt of theſe motions is called *Inſpiration*, and the ſecond *Expiration*.

Inſpiration principally depends on the elevation of the ribs, and the depreſſion of the diaphragm towards the abdomen; and expiration is produced by the elevation of the diaphragm towards the breaſt, and the depreſſion of the ribs.

The muſcles which are by the moderns thought ſubſervient to inſpiration by elevating the ribs, are twenty-two *Intercoſtals*, both internal and external, thoſe which *Steno* has called *Elevatores Coſtarum*, otherwiſe *Supercoſtales*, and the two *Dentari ſuperiores & poſteriores*; I ſhall ſay nothing of the muſcles called *Dentari majores*, the *Subclavij*, and the *Scaleni*, which are alſo claſſed among the muſcles of inſpiration; becauſe if they are well conſidered, they ſeem to have leſs ſhare in this motion than in the particular motions of the parts to which they are fixed, namely, the *Omoplata*, the *Clavicles*, and the *neck*.

The muſcles thought ſubſervient to reſpiration are the *Dentari poſteriores & inferiores*, the *Subcoſtales* of *Verheyen*, and the *Triangularis ſterni*, to which we generally add the *epigaſtric* muſcles, and the two *Sacrolumbares*; and the interior plan of theſe laſt, whoſe tendons being directed from above downwards, croſs thoſe of the exterior plan which go from below upwards, is looked upon as neceſſary to regulate the depreſſion of the ribs determined in part by the ſtrong contractions of the exterior plan, whoſe fleſhy fibres are vaſtly more numerous than thoſe of the interior plan.

The *Intercoſtals* fill the interſtices of the ribs, and are compoſed of two plans of fibres, one external and another internal, which has laid a foundation for diſtinguiſhing two ſorts of intercoſtal muſcles: the outermoſt of theſe two plans runs obliquely from behind forwards, and the innermoſt from before backwards. The firſt extends from the poſterior extremity of the ribs to the union of their cartilagi-

nous

nous portion with the bony where it terminates. The ſecond, or innermoſt plan, begins at the ſternum and ends at the angle which the ribs form poſteriorly: this laſt plan fills the interſtices of the cartilaginous portion of the ribs. The fixed adheſion of theſe intercoſtal muſcles is at the inferior edge of the ſuperior rib, and the movable adheſion at the ſuperior edge of the inferior rib.

The *Supra-coſtales*, or *Elevatores coſtarum* of *Steno*, have their fixed adheſion at the extremity of the tranſverſe apophyſes of the laſt vertebra of the neck, and at thoſe of the eleven ſuperior of the back, and their movable adheſion at the rib below, running obliquely from above downwards. The number of theſe muſcles correſponds to that of the ribs. We ought even to reckon more of them, ſince ſeveral of them are double: in a word, we obſerve that at each tranſverſe apophyſis of the ſeventh, eighth, ninth, and tenth vertebræ of the back, two of theſe muſcles which are of an unequal length are fixed; the ſhorteſt terminates at the rib which is immediately below, and the longeſt paſſes over this rib without adhering to it, and terminates at that next to it.

The *Serrati poſteriores & ſuperiores* have their fix'd adheſions by an aponeuroſis at the ſpines of the two inferior vertebræ of the neck, and of the two ſuperior of the back, and terminate obliquely from above downwards, at the ſecond, third, fourth and fifth true ribs, by ſo many fleſhy appendices.

The *Serrati poſteriores & inferiores* have their adheſions by an aponeuroſis at the ſpines of the laſt vertebra of the back, and of the three ſuperior of the loins, and terminate a little obliquely from below upwards, at the four laſt falſe ribs, by ſo many fleſhy appendices.

The *Triangularis ſterni* has its fixed adheſions internally at the middle and inferior part of the ſternum,

num, and reaching from each ſide obliquely from below upwards, terminates at the cartilages of the five laſt true ribs. This muſcle is divided into ſeveral portions, which are looked upon as ſo many particular muſcles which are called *Sterno-coſtales*.

The *Sterno-coſtales* of *Verheyen* are fleſhy planes, more or leſs broad, very ſlender, and ſituated obliquely, as it were by degrees, on the internal ſurface of the ribs. Their number is not always the ſame, ſince ſometimes there are only ſix, and at others ſeven or eight of them. They have their fixed adheſions at a pretty narrow beginning in the internal ſurface of the inferior rib, oppoſite to their angles, and generally terminate not at the rib immediately above, but at that which is ſuperior to it. The direction of theſe muſcles is oblique, running from behind forwards. Theſe muſcles are more perceptible, and more numerous in the falſe ribs than in the others.

As for the diaphragm, it is a very ſlender and broad muſcle, ſituated at the lower part of the breaſt, which it divides from the abdomen, adhering at its circumference to the edges of the ribs, the xiphoide cartilage, and the vertebræ which correſpond to it; it forms an oblique arch, whoſe anterior part is more elevated than its poſterior.

Tho' the diaphragm is placed among the muſcles ſubſervient to *Inſpiration*, becauſe in acting it is depreſſed towards the abdomen, and by that means augments the cavity of the breaſt; we may nevertheleſs ſay, that it is alſo ſubſervient to expiration, becauſe in ceaſing to act it is raiſed towards the breaſt, and conſequently diminiſhes its cavity: we may add the moſt pleaſant and regular reſpiration in general depends upon the ſingle alternate motions of this partition in general, that is, on its depreſſion towards the abdomen, and its elevation towards

towards the breaſt, without any aſſiſtance from the ribs.

I ſhall give a fuller deſcription of the diaphragm, in treating of the containing parts of the breaſt.

ARTICLE III.

Of the Muſcles of the Extremities.

THE extremities are divided into ſuperior and inferior, of each of which there are two; the ſuperior comprehends on each ſide the ſhoulder, the arm, the fore arm, and the hand; the inferior, the thigh, the leg, and the foot.

The ſhoulder is compoſed, as I have already obſerved, in the oſteology of the omoplata and clavicle: it is principally on the omoplata that the motions and different attitudes of the ſhoulder depend. The clavicle only follows the motions of the omoplata, but at the ſame time binds theſe motions in certain attitudes.

The clavicle has no other muſcles but the *ſubclavian*, which has its fixed adheſion anteriorly at the firſt rib, in the part where it is joined to its cartilaginous portion, and ſlipping under the clavicle, it terminates along its inferior and external part. This muſcle ſerves to depreſs the clavicle.

Of the Muſcles of the Omoplata.

The Omoplata performs ſeveral different motions, for beſides its power of moving upwards and downwards, it can alſo move forwards and backwards. The muſcles deſtin'd for theſe motions are five in number, namely, the *Trapezius*, the *Rhomboides*, the *Elevator proprius*, the *Pectoralis minor*, and the *Serratus major*.

The *Trapezius* has its fixed adheſions in the middle of the tranſverſe apophyſis of the occipital, deſcends

ſcends along the neck and back, adhering to the ſpines of the two laſt cervical vertebræ, and to thoſe of all the dorſal vertebræ, and terminates along the ſuperior edge of the ſpine of the *Omoplata* and *Acromion*, and at the poſterior external part of the clavicle.

This muſcle has no immediate adheſion to the ſpines of the ſuperior vertebræ of the neck, but only to a membranous ligament, which from the occipital, adheres to the ſpines of all the vertebræ of the neck, where it terminates. It is called the poſterior cervical ligament, and is fortified by its union with the tendinous fibres of the *Muſculi Trapezij* and the two *Splenij*.

The *Rhomboides* has its fixed adheſions at the ſpines of the two inferior vertebræ of the neck, and of the four ſuperior of the back, and terminates at the external edge of the baſe of the omoplata. This muſcle is compoſed of two portions, of which the ſuperior and ſmalleſt joins to the inferior adheſion of the *Elevator proprius omoplata*.

The muſcle commonly called *Elevator proprius Omoplata*, and by ſome *Angularis*, has its fixed adheſions at the tranſverſe apophyſes of the four ſuperior vertebræ of the neck, and terminates at the ſuperior angle of the omoplata.

The *Pectoralis minor*, called alſo *Serratus anterior*, has its fixed adheſions at the anterior part of the ſecond, third, and fourth true ribs, by as many fleſhy appendices, and running obliquely from below upwards, terminate at the *coracoide* apophyſis.

The *Serratus major* is a muſcle partly concealed under the omoplata, to which it is joined anteriorly all along its baſe; then it runs to the fore part of the breaſt, dividing itſelf into ſeveral portions, more or leſs long, diſpoſed like rays, and in ſuch a manner that their extremities form a kind of arch or curve line: theſe portions leave between them a va-

cuity,

cuity, which is augmented in proportion as they approach to their adheſion, which is at the external ſurface of the bony portion of all the true ribs, and of the firſt of the falſe, advancing ſometimes to the third. This muſcle, at the place of its adheſions to the ribs, forms as it were ſo many angular appendices.

Several portions of this muſcle running a little obliquely from below upwards, croſs the ribs, whoſe direction is from above downwards, having only its inferior portions whoſe direction correſponds to that of the ribs.

By turning the Omoplata forwards, we diſcover at the ſuperior part of the internal ſurface of this muſcle a ſmall plan, which ſome look upon as a particular muſcle, fixed at one part to the ſuperior angle of the omoplata, and at another to the two firſt true ribs. Some confound this ſmall muſcle with the ſerratus major, looking upon it as a portion of that muſcle. The Rhomboides muſt be removed, the better to ſee this particular plan.

The common opinion with reſpect to the uſe of the muſcles of the Omoplata is, that the Trapezius by its ſuperior portion raiſes the omoplata, depreſſes it by its inferior portion, and draws it backward by its middle portion, according as each of theſe portions acts ſingly, the two others being at reſt. 'Tis alſo to be obſerved, that when all the three act together, they only produce the ſame effect attributed to the middle portion, but with more force. As for the *Rhomboides*, its uſe is to carry the Omoplata backwards, and that of the Pectoralis minor to carry it forwards, being aſſiſted by the *Serratus major*. As for the *Elevator proprius*, its name ſufficiently denotes the uſe aſcribed to it.

Some think that in all theſe different motions, the Omoplata only ſlips over the ſurface of the ribs, always preſerving its natural ſituation, that is to ſay,

ſay, one of its poſterior angles is neither removed farther from, nor brought nearer the ſpine of the back than the other. Mr. *Winſlow* propoſes a contrary opinion, and aſſerts, that in moſt motions of the *Omoplata*, that bone turns more or leſs upon its proper plan, and that in two manners; thus, for example, if a perſon intends to raiſe the ſhoulder, 'tis the acromion which at that time aſcends, while the poſterior and ſuperior angle of the omoplata deſcends, approaching to the ſpine of the back, and while the inferior is removed from it: but the contrary happens when we lower the ſhoulder, for at that time the acromion is depreſſed, the ſuperior angle is raiſed in receding from the ſpine of the back, and the inferior angle approaches to it. 'Tis true, ſays Mr. *Winſlow*, that we can advance or draw back the ſhoulder directly, and in making the *Omoplata* ſlip over the ribs, that is to ſay, without raiſing or depreſſing it; but this is a very conſtrained and inconſiderable motion. In the former caſe, the Acromion with the adjacent extremity of the Clavicle recedes from the ribs, and in the latter approaches to them.

According to this opinion, the uſe of the *Trapezius* muſcle, conſidered with reſpect to its adheſions to the ſpine of the Omoplata, to the Acromion and the Clavicle; or conſidered with reſpect to the different direction of its fibres, is to raiſe the ſhoulder, or rather to turn the top of the *Omoplata*, that is to ſay, the Acromion uppermoſt, and to hinder the depreſſion of it. But as this muſcle is too ſlender, and has too few fibres to ſurmount or counterballance certain reſiſtances, it is aſſiſted by the *Serratus major*. To this laſt is alſo aſcribed the uſe of bringing the Omoplata more or leſs forwards, and even in certain caſes of hindering it from being puſhed backwards.

As

As for the *Rhomboides*, conſidered with reſpect to its adheſions and direction, it ſeems to draw the ſubſpinal portion of the Omoplata obliquely backwards and upwards, and conſequently to be the regulator of the *Trapezius* and *Serratus major* when they draw the Acromion upwards; for it brings the Omoplata into its natural poſition, when theſe muſcles ceaſe to act. The ſame may be ſaid of the muſcle commonly called the *Elevator proprius omoplata*, for it concurs with the *Rhomboides* to bring back the *Omoplata* to its natural ſituation, by its adheſion to its ſuperior angle when theſe muſcles ceaſe to act. The *Pectoralis minor* alſo ſerves to bring the Omoplata to its natural ſituation, by drawing down the Coracoide Apophyſis to which it is fixed.

Of the Muſcles of the Arm.

The arm conſiſts of one bone, called the *Humerus*. Its articulation with the Omoplata permits it to move in all directions, that is to ſay, to be raiſed, depreſſed, carried forwards and backwards, and to move round its axis, or its length, or in the manner of a pivot, but alſo in the manner of a ſling, that is to ſay, to perform the motion of *Circumduction*. Theſe different motions, which are ſo much the more free as the head of the humerus is not conſtrained by meeting with the bony edges of the cavity of the Omoplata, are performed by the action of ſeveral muſcles, which are generally reckoned nine in number.

The common opinion with reſpect to the uſe of theſe muſcles is, that the arm is raiſed by the *Deltoide* and *Supra-ſpinalis*, depreſſed by the *Dorſalis major* and the *Rotundus major*, to which ſome add the *Subſcapularis*, tho' generally the uſe aſſigned to this muſcle is to bring the arm to the ribs, that it is carried forward by the *Pectoralis major* and the *Coracobrachialis*, and backwards by the *Subſpinalis* and

Teres

Teres rotundus; in a word, that it performs rotatory motions round its axis or length, by the alternate motions of the *Subſcapularis*, the *Rotundus major*, and the *Rotundus minor*; to which we may add the *Dorſalis major* and the *Subſpinalis*, aſcribing the ſemi-rotation inwards to the *Dorſalis major*, the *Rotundus major*, and the *Subſcapularis*, and the ſemi-rotation externally to the *Subſpinalis* and the *Rotundus minor*. As for the ſling-like motion, or the circumduction of the arm, it is thought to depend on the ſucceſſive action of all its muſcles.

But if we carefully advert to the different adheſions of the muſcles of the arm, to their direction, and the changes which may happen in them according to different attitudes, and laſtly, to what I have ſaid of the general co-operation of muſcles, it muſt be granted that the particular functions of theſe muſcles are not bounded to thoſe commonly aſcribed to them *.

The deltoide has its fixed adheſions anteriorly at the middle and external parts of the clavicle, at the external edge of the Acromion, and along the inferior lip of the ſpine of the Omoplata; and its movable adheſion at the ſuperior and almoſt middle part of the *Humerus*, by a very ſtrong tendon. It alſo adheres to the exterior edge of the *Humerus*, at the prominent line or creſt which correſponds to its great tuberoſity. This muſcle paſſes over the articulation of the arm with the ſhoulder, without adhering to it.

This muſcle is compoſed of eighteen or twenty ſmall ſimple muſcles, diſpoſed in contrary directions to each other, and united by intermediate tendons.

The *Supra-ſpinalis* has its fixed adheſions at the poſterior and middle parts of the *Foſſa ſupra-ſpinalis*

* See Mr. *Winſlow*'s Expoſ. Anatom.

omoplatæ,

omoplatæ, and its tendon, which is very ſtrong, paſſes under the Acromion, and terminates at the firſt of the ſmall ſurfaces obſervable in the great tuberoſity of the humerus.

The *Dorſalis major* has its fixed adheſions poſteriorly by an aponeuroſis at the external lip of the creſt of the *Os Ileum*, at the ſuperior ſpines of the *Os ſacrum*, at thoſe of the vertebræ of the loins, and of the ſix or ſeven inferior vertebræ of the back, and by fleſhy appendices to the anterior part of the four laſt falſe ribs. This muſcle, after having covered a great part of the back, paſſes over the inferior angle of the Omoplata, to which it generally adheres by a plan of fleſhy fibres; and its tendon which is flat, after a little circumvolution, terminates at the ſuperior and internal part of the *Humerus*, immediately at a prominent line which borders its ſinuoſity, and which correſponds to the ſmall tuberoſity of this bone.

The *Rotundus* or *Teres major* has its fixed adheſions in all the external ſurface of the inferior angle of the *Omoplata*, and running obliquely from below upwards, reaches the ſuperior and internal part of the *Humerus*, where it terminates in the ſame place with the *Dorſalis major*, advancing a little lower.

The tendons of theſe two muſcles are covered at the place of their adheſion to the *Humerus*, by a ſmall tendinous expanſion, which ſeems to be furniſhed by the *Subſcapularis*, and terminates at the *Humerus*, a little below the adheſion of theſe muſcles. The tendons of theſe two muſcles are not confounded as at firſt they appear; we only obſerve, after having removed the tendinous expanſion which covers them, and which ſecures them in the form of a ligamentary band, that theſe tendons communicate with each other by ſome collateral fibres.

The *Pectoralis major* has its fixed adheſions anteriorly at the middle and internal parts of the clavicle all along the *Sternum*, and at the cartilages of all the true ribs, and terminates by a pretty ſtrong and flat tendon, at the ſuperior and anterior part of the humerus, at the external edge of the ſinuoſity of this bone.

The fibres of the *Pectoralis major* are ſo diſpoſed at the place of its adheſion to the humerus, that thoſe which correſpond to the ſuperior part of that muſcle, terminate lower than the fibres of its inferior portion.

From the inferior part of the pectoral there ariſes a fleſhy appendix, which loſes itſelf in the aponeuroſis of the obliquus major of the abdomen.

The *Coraco-brachialis* has its fixed adheſion at the *coracoide* apophyſis, and terminates internally at the ſuperior and almoſt middle part of the *Humerus*. This muſcle is perforated in the middle, for the paſſage of a pretty conſiderable nerve.

The *Subſpinalis* has its fixed adheſions almoſt in the whole *Foſſa ſubſpinalis* of the omoplata, and terminates at the ſecond ſmall ſurface of the great tuberoſity of the *Humerus*.

The *Rotundus* or *Teres minor* has its fixed adheſions along the inferior rib of the omoplata, and terminates at the third ſmall ſurface of the great tuberoſity of the *Humerus*. Theſe two muſcles are partly covered by a ligamentary band or expanſion, which from the ſpine of the omoplata runs to its inferior rib.

The *Subſcapularis* has its fixed adheſions in all the internal ſurface of the *Omoplata*, and terminates at the ſmall tuberoſity of the *Humerus*.

Of

Of the Muſcles which move the fore Arm upon the Humerus, and particularly of thoſe which move the Radius upon the Os Cubiti.

The fore Arm performs four motions, ſince beſides flexion and extenſion, it has two particular motions called *Pronation* and *Supination*. In pronation the fore arm and hand are turned downwards or inwards, and in ſupination both are turned upwards or outwards. In flexion and extenſion the two bones of the fore arm move upon the *Humerus*, and in pronation and ſupination, the radius has not only a motion on the *Humerus*, but alſo other two which are particularly performed on the *Os Cubiti*.

The flexion of the fore arm depends on the action of two muſcles, called the *Biceps* and the *Brachialis internus*, and the extenſion is performed by four muſcles, called the *Longus*, the *Brevis*, the *Brachialis externus*, and the *Anconæus*.

The Biceps has its fixed adheſions by two tendons, call'd the heads of the biceps, and of which one comes from the extremity of the *coracoide* apophyſis being confounded with the ſuperior portion of the *coraco-brachialis*; and the other has its fixed adheſion immediately above the edge of the *glenoide* cavity of the *Omoplata*. This laſt paſſes into the ſinuoſity made in the upper part of the humerus. Each of theſe tendons correſponds to a fleſhy portion, and theſe two portions unite near the middle of the arm to form but one body of a muſcle, which deſcends along its anterior and ſomewhat internal part, and terminates at the bending of the elbow by a tendon and an aponeuroſis. The tendon adheres to the poſterior edge of the tuberoſity of the radius, which is covered with a ſmooth and poliſh'd cartilage, and it is on account of this adheſion to the tuberoſity of the *Radius*, that the biceps concurs to

ſupination, according to the remark of Mr. *Winſlow*, and even with more force than any of the muſcles commonly thought to be deſtin'd for that purpoſe, the tendon of this muſcle at that time ſlipping over a great portion of that eminence, as it were on a pully.

As for the aponeuroſis of the biceps, it paſſes over the *Rotundus pronator* and the *Radialis internus*, where it ſeems to terminate; but it is continued over all the muſcles of the internal and poſterior ſurface of the fore arm, and even appears to be united to that which covers the muſcles of its external ſurface. The aponeuroſis of the Biceps is often in greater danger of being pricked than its tendon, in Veneſection.

There have been ſubjects in which this muſcle has had a third head, which was fleſhy. It roſe anteriorly from almoſt the inferior part of the *Humerus*, and loſt itſelf in the body of that muſcle, near its end.

The tendon of the *Biceps* which ariſes from the neck of the *Omoplata*, pierces the capſular ligament of the articulation, and afterwards ſlips over the head of the *Humerus* to reach its ſinuoſity, in which it is retained by a membranous ſheath, which accompanies it to the fleſhy portion of that muſcle, where adhering to the tendon it ſtops up the canal, and by that means prevents the effuſion of the *Synovia*.

The *Brachialis internus* has its fixed adheſions anteriorly at the middle and inferior parts of the *Humerus*, advancing on both ſides to the angles or creſts which correſpond to each condyle, and it terminates at the ſuperior and internal part of the *Cubitus*. Several fibres of this muſcle terminate at the capſular ligament, which hinders this ligament from being pinched in the flexion of the fore arm by the approach of the bones.

The

The *Extenſor longus* has its fixed adheſions at the inferior part of the neck of the *Omoplata*, afterwards deſcends along the poſterior part of the *Humerus*, where it is confounded with the *Extenſor brevis* which adheres all along the internal ſurface of this bone, and with the *Brachialis externus* which adheres all along its external ſurface. Theſe three muſcles united together are continued to the inferior part of the Humerus, adhering on each ſide to the angles or creſts which correſpond to each *Condyle*, and terminate by a thick aponeurotic tendon at the *Olecranon*. Several fibres of this muſcle alſo adhere to the capſular membrane.

The fourth muſcle, called *Anconæus*, appears to be a continuation of the *Brachialis externus:* it has its fixed adheſions at the external condyle of the Humerus, and terminates in the external ſurface of the *Cubitus*, advancing three fingers breadth below the *Olecranium*.

Pronation depends on the action of two muſcles, called the *Rotundus* and the *Quadratus*; and *Supination* is thought to be produced by the action of other two muſcles, called the *Longus* and the *Brevis*.

The *Rotundus* has its fixed adheſion at the internal condyle of the *Humerus*, and terminates anteriorly near the middle part of the *Radius*, running obliquely from above downwards.

The *Quadratus* has its fixed adheſion at the inferior and internal part of the *Cubitus*, and terminates at the inferior and internal part of the *Radius*, advancing to the edge of its anterior ſurface.

The *Supinator longus* has its fixed adheſions above the external condyle of the *Humerus*, immediately at the creſt or bony line which correſponds to that condyle. It deſcends along the anterior ſurface of the *Radius*, and terminates by a flat tendon at the inferior part of that bone, at the interior ſide of its anterior ſpine.

This muſcle ſeems to have a greater ſhare in the flexion of the fore arm, than in the motion of *Supination*, according to the remark of Mr. *Heiſter* *.

The *Supinator brevis* has its fixed adheſions at the external condyle of the *Humerus*, and at the ſuperior external part of the *Cubitus*, and runs obliquely to the ſuperior and internal part of the *Radius*, where it terminates in embracing it to about four fingers breadth below its articulation. To theſe muſcles we ought to add the *Biceps*, as I have before obſerved.

Of the Muſcles which move the Carpus, or Wriſt, on the fore Arm.

The *Carpus* can bend itſelf on the fore arm, extend itſelf, move on both ſides, as well forwards as backwards, and perform the motion of *Circumduction*. All theſe motions are performed by the action of five muſcles. Flexion is performed by the *Cubitalis internus*, the *Radialis internus*, and the *Palmaris*. Extenſion by the *Cubitalis externus*, and the *Radialis externus*. Its lateral motions are made forwards and backwards; the lateral motion forwards depends on the action of the *Cubitalis internus*, and the *Radialis internus*; and the motion backwards is performed by the *Cubitalis externus*, and the *Radialis externus*. As for the motion of *Circumduction*, it is to be attributed to the ſucceſſive action of all the muſcles of the wriſt.

The *Cubitalis internus* has its fixed adheſions at the internal condyle of the *Humerus*, and at the ſuperior and middle part of the poſterior ſurface of the *Cubitus*, and terminates at that bone of the carpus which is out of the row.

* See *Heiſter*'s compend. anatom. 1727.

The

The *Radialis internus* has its fixed adheſions at the internal condyle of the Humerus, confounds its fibres with thoſe of the *Rotundus pronator*, and deſcending obliquely towards the internal and anterior part of the fore arm, paſſes its tendon under a particular annular ligament, and thro' the ſinuoſity of the bone of the carpus called *Trapezius*, to terminate at the ſuperior and internal part of that bone of the *Metacarpus* which ſupports the fore finger.

The *Palmaris* has its fixed adheſion at the internal condyle of the *Humerus*, and its tendon, which is ſlender and flat, deſcends along the internal part of the fore arm, paſſes over the internal common annular ligament to which it adheres cloſely, and afterwards loſes itſelf in an aponeuroſis which covers almoſt the whole palm of the hand. This *Aponeuroſis* has laid a foundation for calling this muſcle *Palmaris*, becauſe people have imagined that it was formed by the ſpreading of the fibres of that tendon.

There is another muſcle nearly of a ſquare figure, which alſo loſes itſelf in this aponeuroſis, and is called *Palmaris brevis:* it is a ſmall plan of fleſhy fibres, ſituated tranſverſly on that eminence of the hand which correſponds to the internal and ſuperior part of the *metacarpal bone* which ſupports the little finger, adhering ſtrongly to the ſkin. This muſcle ſeems to have no connexion with the neighbouring bones, and it is ſaid to concur with the *Metacarpal*, which I ſhall afterwards deſcribe in rendering the palm of the hand hollow, and enabling it to form what we call the *Cup of Diogenes.*

The *Palmaris longus* is not found in all ſubjects; but it is otherwiſe with the *Palmaris brevis* and the *Palmaris Aponeuroſis*, which are conſtantly found: this *Aponeuroſis* covers a part of the palm of the hand, and after having furniſhed filaments to the portion of the ſkin which correſponds to it, terminates at

the internal and inferior part of the metacarpal bone by ſeveral fibres, which leave interſtices for the paſſage of the flexor tendons of the fingers, and for the nerves and blood-veſſels diſtributed to them.

The *Cubitalis externus* has its fixed adheſions at the external condyle of the *Humerus*, and almoſt at all the external ſurface of the Cubitus; and after having paſſed thro' the ſinuoſity of this bone, and thro' a particular annular ligament, it terminates at the ſuperior and external part of that bone of the *Metacarpus* which ſupports the little finger.

The *Radialis externus* comprehends two muſcles, one of which is called *Longus* and the other *Brevis*; the *Longus* has its fixed adheſions a little above the external condyle of the *Humerus*, and the *Brevis* has its adheſions at the condyle itſelf. Theſe two muſcles lie on the external ſurface of the *Radius*, and the tendons by which they terminate paſs each under a particular annular ligament, and reach to the metacarpal bones, namely, that of the *Longus* to the ſuperior external part of the bone which correſponds to the fore finger, and that of the *Brevis* to the ſuperior external part of the bone which correſponds to the mid-finger.

Of the common Muſcles of the Fingers.

The fingers move in different manners, for beſides flexion and extenſion, they have the power of moving to each ſide, and of performing the motions of *Circumduction*. The muſcles deſtin'd for all theſe motions have been divided into *common* and *proper*.

The *common* muſcles are thoſe which move the four laſt fingers, and the *proper* muſcles are thoſe which are only deſtin'd for the particular motions of certain fingers. Both of theſe alſo receive the names of *Flexors*, *Extenſors*, *Abductors*, and *Adductors*, according to their different functions. The

The muſcles called *Sublimis* and *Profundus* are the common flexors of the fingers, and they have but one common extenſor. The four *Lumbricales*, and the ſix *Interoſſei*, are deſtin'd for the motions of *Adduction* and *Abduction*.

The *Sublimis* * has its fixedadhe ſions in the internal condyle of the *Humerus*, in the ſuperior internal part of the *Cubitus*, and the *Radius*; it is afterwards divided into four portions, each of which furniſhes a pretty conſiderable tendon; theſe four tendons paſs under the internal common annular ligament, and terminate in the hand in the middle of the ſecond phalanx of the four laſt fingers. The tendons of this muſcle are a little flat, and even divided at their extremities for the paſſage of the tendons of the *Profundus* †.

The *Profundus* has its fixed adheſions at the ſuperior and middle parts of the *Cubitus*, as well in its internal as poſterior ſurface, and at the *interoſſeous* ligament; it is afterwards divided into four portions, as well as the *Sublimis*, which produce as many tendons; theſe tendons ſlip behind thoſe of the *Sublimis*, paſs alſo under the internal common annular ligament, being lodged in a kind of pipe, formed in that part by the bones of the *Carpus*, and continuing their road to the hand and fingers, they terminate at the middle and internal part of the third phalanx of the four laſt fingers, after having paſſed thro' the fiſſures of the tendons of the *Sublimis*.

The tendons of theſe two muſcles are incloſed in ſo many membranous ſheaths, which are common to them; theſe ſheaths begin at the common internal annular ligament, continue to the hand, and along the fingers to their third phalanx, where they terminate with the tendons of the *Profundus*. In the whole extent of the two firſt phalanges of the

* Or Perforatus.

† Profundus or Perforans.

four

four laſt fingers, except at the parts of their articulation, we find very ſtrong ligamentary bands which fortify theſe ſheaths; theſe bands are fixed to the lateral parts of thoſe phalanges, and if we open theſe ſheaths, beſides the *Synovia* which moiſtens their internal ſurface, as well as the tendons which they include, we perceive ſmall ligamentary bridles which go from the firſt and ſecond phalanx, and loſe themſelves in the tendons of the *Sublimis* and *Profundus*.

The ſkin which covers the fingers is as it were glewed to the parts of the ſheath, which correſpond to the articulations of the ſecond phalanx with the ſecond and third.

All theſe remarks concerning the tendons of the *Sublimis* and the *Profundus*, are abſolutely neceſſary for the treatment of all the different ſpecies of the *Panaris*, and particularly of that in which the Humour has its ſeat in the ſheath of the tendons.

The *extenſor* muſcle of the four laſt fingers, commonly called the *Extenſor communis*, has its fixed adheſions at the external condyle of the *Humerus*, deſcending along the external ſurface of the fore arm, where it adheres to the *interoſſeous* ligament, and confounds moſt of its fibres with thoſe of the adjacent muſcles. It is afterwards divided into four portions, each of which furniſhes a tendon; theſe four tendons paſs under the external and common annular ligament, and continue over the hand and along the external ſurface of the phalanges of the fingers, advancing to the roots of the nails, where they terminate. Theſe tendons communicate with each other on the inferior part of the bones of the *Metacarpus* by tendinous bands, which run obliquely from one to another.

We obſerve that theſe tendons become larger and broader, in proportion as they approach to the fingers; and their fibres are even ſenſibly ſeparated at

the

the parts of their articulations, principally at that of the firſt phalanx with the ſecond, where theſe fibres by their ſeparation leave a vacuity in form of a ſmall lozenge; and in this part we only diſcover ſome very fine tendinous fibres, which run tranſverſely from one ſide of the tendon to the other.

The *Lumbricales* or *Vermiculares*, are four ſmall muſcles placed in the hollow of the hand, which riſe from the tendons of the *Profundus* under the internal and common annular ligament, and terminate each by a very ſhort tendon at the ſuperior and internal part of the firſt phalanx of the four laſt fingers, and by a longer tendon along the internal and anterior part of this firſt phalanx, confounding itſelf with the tendons of the *Extenſor communis*.

The *interoſſeous* muſcles poſſeſs the interſtices, which the bones of the *Metacarpus* leave between them: they are ſix in number, and are diſtinguiſhed into internal and external. Mr. *Winſlow*, after Mr. *Habicot*, an ancient ſurgeon of *Paris**, has obſerved, that the adheſions of theſe muſcles are not ſuch as they are generally deſcribed. In a word, he has obſerved, that of the three internal *Interoſſei*, the firſt or moſt anterior has its fixed adheſions internally at the ſuperior part of that bone of the *Metacarpus* which ſupports the middle finger, and along the poſterior part of that which ſupports the fore finger, and terminates by a ſhort and pretty ſtrong tendon, at the poſterior and ſuperior part of the firſt phalanx of that finger.

The ſecond of the internal *Interoſſei* has its fixed adheſions internally at the ſuperior part of that bone of the *Metacarpus* which ſupports the middle finger, and along the anterior part of that which ſupports the annular finger, and alſo terminates by a ſhort

* See memoirs of the academy of ſciences, 1720.

tendon

tendon at the ſuperior and anterior part of the firſt phalanx of that finger.

The third of the *Interoſſei interni* has its fixed adheſions internally at the ſuperior part of that bone of the Metacarpus which ſupports the annular finger, and along that which ſupports the little finger, and alſo terminates by a tendon at the ſuperior and anterior part of the firſt phalanx of that finger.

As for the external *Interoſſei*, the firſt or moſt anterior has its fixed adheſions externally at the ſuperior part of that bone of the *Metacarpus* which ſupports the fore finger, and along that which ſupports the middle finger, and terminates at the ſuperior and anterior part of the firſt phalanx of that finger.

The ſecond has its fixed adheſions externally at the ſuperior part of that bone of the *Metacarpus* which ſupports the annular finger, and along that which ſupports the middle finger, and terminates at the poſterior and ſuperior part of the firſt phalanx of that finger.

The third has its fixed adheſions externally at the ſuperior part of that bone of the *Metacarpus* which ſupports the little finger, and along that which ſupports the annular finger, and terminates at the poſterior and ſuperior part of the firſt phalanx of that finger.

It is to be obſerved that all the interoſſeous muſcles, whether internal or external, beſides the tendons by which they terminate at the firſt phalanges, alſo furniſh aponeurotic expanſions which cover a portion of theſe phalanges, confounding themſelves with the *Extenſor commnnis*.

The *Sublimis* and *Profundus* bend the four laſt fingers; the Sublimis in particular bends the ſecond phalanx of theſe fingers, and at the ſame time carries the firſt along with it, and the *Profundus* particularly bends the third. Theſe muſcles are alſo looked upon

upon as auxiliaries to the *Cubitalis* and *Radialis internus*, and as flexors of the wriſt.

The *Extenſor communis* ſerves to extend the four laſt fingers, to keep them extended, and to moderate or counterbalance the action of the flexors.

The *Interoſſei*, both internal and external, by the aponeurotic expanſions which they furniſh to the *Extenſor communis*, ought to be looked on as auxiliaries of that muſcle, and by their particular adheſions to certain fingers, they move them differently towards the ſides. Thus the firſt of the *Interoſſei interni* ſerves to perform the abduction of the fore finger, or to carry it to the middle finger, the ſecond performs the adduction of the annular finger, and the third that of the little finger. Of the external *Interoſſei*, the firſt and ſecond alternately perform the adduction and abduction of the middle finger, and the third the abduction of the annular, that is to ſay, it carries it towards the little finger; and if the adheſions of theſe muſcles are changed in certain ſubjects, their uſes in ſuch caſes will correſpond to the particular diſpoſition of theſe adheſions.

The *Lumbrical* or *Vermicular* muſcles, by the union of their tendons with thoſe of the *Interoſſei*, are the auxiliaries of theſe laſt, not only with reſpect to the lateral motions of the four laſt fingers, but alſo with reſpect to their extenſion. Theſe muſcles are alſo the auxiliaries of the *Sublimis*, in the flexion of the firſt phalanx of the fingers.

Of the proper Muſcles of the Fingers.

The proper muſcles of the fingers belong to the thumb, the fore finger, and the little finger.

The thumb has the liberty of moving in as many directions as the other fingers, which it performs by the action of five muſcles, namely, one *flexor*, two *extenſors*, one *adductor*, called *Thenar*, and

and one *abductor*, called *Anti-thenar*, to which ſome add a ſecond *Abductor*.

The flexor of the thumb has its fixed adheſions at the ſuperior and internal part of the interoſſeous ligament, and along the internal ſurface of the *Radius*; and after having paſſed under a particular annular ligament, covered by the annular internal and common ligament, reaches to the poſterior part of that finger, in order to terminate in the middle of its third phalanx. The tendon of this muſcle, from its paſſage under its particular annular ligament to its end, is included in a membranous ſheath which is not fortified by any ligamentary band, like that of the flexor tendons of the other fingers.

The *extenſor muſcles* of the thumb are divided into the *Longus* and the *Brevis*; the *Longus* has its fixed adheſions externally almoſt at the ſuperior part of the *Cubitus* and at the interoſſeous ligament, runs obliquely towards the middle part of the *Radius*, to which it alſo adheres, and advances towards its anterior and inferior part, where it paſſes under an annular and particular ligament, and furniſhes two tendons, one of which terminates at the ſuperior and anterior part of the firſt phalanx of the thumb; and the other loſes itſelf at the ſuperior and anterior part of the ſecond.

The *Extenſor brevis* has its fixed adheſions externally at the Cubitus and interoſſeous ligament, immediately below the *Extenſor longus*, runs obliquely towards the inferior and external part of the *Radius*, where is paſſes under a particular annular ligament, and advances over the anterior part of the thumb, to terminate at its third phalanx.

The *thenar* muſcle has its fixed adheſions at the internal common annular ligament, and at that bone of the Carpus which ſupports the thumb; it afterwards adheres all along the poſterior and internal part of the firſt phalanx of that finger, and advances

vances to the ſuperior and internal part of the ſecond, where it terminates. This muſcle is ſeparated in its length into two portions, which have almoſt the ſame adheſions, and which in acting ſeparate the thumb from the other fingers.

The *Anti-thenar* is a flat muſcle, nearly of a triangular figure, which has its fixed adheſions at its broadeſt portion internally at that bone of the Metacarpus which ſupports the fore finger and middle finger, even advances to the bones of the ſecond row of the *Carpus* which correſpond to it, afterwards goes to the poſterior and external part of the thumb, to terminate by its narroweſt portion at the inferior part of its firſt phalanx, and at the ſuperior of the ſecond by a pretty ſtrong tendon. Mr. *Winſlow* calls this muſcle *Meſo-thenar*, and ſays, that its uſe is to bring the firſt phalanx of the thumb near to the hollow of the hand, which it does more or leſs obliquely according as it acts alone or with the large portion of the Thenar. He gives the name of *Anti-thenar* or *Demi-interoſſeous* of the thumb, to a muſcle ſituated betwixt the firſt phalanx of that finger and the firſt bone of the metacarpus, and which has its fixed adheſions at the anterior and inferior part of this bone of the Metacarpus, appears even to advance to the internal and ſuperior part of the firſt phalanx of the fore finger, and terminates externally almoſt all along the firſt phalanx of the thumb. This author ſays, that the uſe of this muſcle is to bring the thumb near to the fore finger. Hitherto moſt people have confounded this muſcle with the adductor of the fore finger, which I ſhall afterwards deſcribe.

The fore finger has three particular muſcles, namely, one *Extenſor*, one *Adductor*, and one *Abductor:* the *Extenſor*, called *Indicator*, has its fixed adheſions externally at the middle and almoſt inferior part of the Cubitus and at the interoſſeous

ligament, paſſes afterwards under the external and common annular ligament, and reaches the fore finger to join the tendon of the *Extenſor communis*, and accompany it all along that finger to the root of the nail.

The *Muſculus Abductor* has its fixed adheſions at the top of the external lateral part of the firſt phalanx of the thumb, at that bone of the Carpus which ſupports it, and all along the anterior part of the firſt bone of the *Metacarpus*, and terminates at the ſuperior and anterior part of the firſt phalanx of the fore finger. This muſcle ſeparates the fore finger from the others, and brings it nearer to the thumb.

The muſcle which brings the fore finger to the three others by ſeparating it from the thumb, is the firſt of the internal *Interoſſei*, which I have ſaid is its *Abductor*.

The little finger has three proper muſcles, namely, one *Extenſor*, one *Abductor*, and one *Adductor*. The extenſor has its fixed adheſions at the external condyle of the *Humerus*, and at the *interoſſeous* ligaments. It deſcends along the fore arm, confounding its fibres with thoſe of the *Extenſor communis*, and afterwards produces a pretty ſlender tendon, which paſſes under an annular and particular ligament, and terminates externally all along the phalanges of this finger, advancing to the root of the nail, and uniting with the tendon of the *Extenſor communis*, which terminates at the ſame finger.

The *adductor* muſcle is the laſt of the *Interoſſei interni*, which in acting brings the thumb nearer to the other fingers.

As for the *abductor* muſcle, called *Hypothenar*, it has its fixed adheſions a little poſteriorly at the annular, internal and common ligament, and at the bone of the *Carpus* called *Piſiforme*, and terminates

at the poſterior and ſuperior part of the firſt phalanx of the little finger. There is a ſecond muſcle which ſome confound with the *Hypothenar*, and which has no adheſion to the little finger: it has its fixed adheſions at the *cuneiform* bone of the *Carpus*, and at the adjacent portion of the annular, internal, and common ligament. Thence its fibres run more or leſs obliquely towards the internal and ſomewhat poſterior part of the laſt bone of the *Metacarpus*, where this muſcle terminates. Mr. *Winſlow* calls it *Metacarpal*, and ſays, that its uſe is to turn the fourth bone of the Metacarpus towards the thumb, and by this means to render the palm of the hand hollow, which is called making the *Cup of Diogenes*. This muſcle is partly covered by the Hypothenar.

Of the Muſcles of the Thigh.

The inferior extremity comprehends the *Thigh*, the *Leg*, and the *Foot*. The *Thigh* moves in different directions, for beſides its power of moving forwards, backwards, inwards and outwards, that is to ſay, of *flexion*, *extenſion*, *adduction* and *abduction*, it can alſo move round its own axis or length, making ſmall *Semi-rotatory* motions, both internally and externally: laſtly, it can turn in the manner of a *Sling*, or make the motion of *Circumduction*. Theſe different motions are performed by the action of ſixteen muſcles. Moſt anatomiſts not adverting to the ſemi-rotations of the thigh, are content to diſtribute the muſcles of this part according to the five principal motions which they have diſcovered in it; they have ſaid, that flexion depends upon three muſcles, called *Pſoas*, the *Iliacus*, and the *Pectinæus*; that extenſion is performed alſo by three muſcles, called *Glutæi*, diſtinguiſhed into *great*, *middle* and *little Abduction* by the three *Triceps*; and they have attributed Abduction to the *Quadri-gemini*, that is to ſay, to the *Pyriformis*, the *Geminus ſuperior*, the *Geminus inferior*,

ferior, and the *Quadratus*; and they have made the motion of circumduction to depend on the two *Muſculi obturatores*, counting the *Faſcia lata* among the muſcles of the leg. But the moſt common opinion concerning the uſe of theſe muſcles, and which even appears founded on a perfect knowledge of the adheſions and direction of theſe organs is that which makes the flexion of the thigh to depend on the action of the *Pſoas*, the *Iliacus* and *Pectinæus*; and the *Extenſion* on the action of the *Gluteus major*, only attributing its Abduction to the *Faſcia media* and *Faſcia minor*, and its *Abduction* to the *Muſculi tricipites*. As for its demirotatory motions, the *Demirotation* outwards is aſcribed to the *Quadrigemini*, to which we add the two *Obturatores* as their auxiliaries; and the *Demirotation* inwards is attributed to the *Gluteus major*. And laſtly, 'tis thought that the motion of *Circumduction* of the thigh, depends on the ſucceſſive action of all its muſcles.

Mr. *Winſlow* thinks that the *Media* and *Minor Faſcia* do not ſerve to the *Abduction* of the thigh, except when a perſon ſtands, and that they perform the *Demirotation* outwards when a perſon is ſitting; which is the contrary with reſpect to the *Quadrigemini* and *Obturatores*, which he imagines perform the *Abduction* of the thigh when it is bent, and its *Semi-rotation* outwards when it is extended.

We may eaſily comprehend the different functions of theſe muſcles, when having well examined their adheſions and direction, we reflect on the changes which may happen to them in different attitudes.

The *Pſoas* has its fixed adheſions anteriorly at the lateral part of the body of the laſt vertebra of the back, and of the four ſuperior of the loins, and at the tranſverſe apophyſes of theſe ſame vertebræ. It afterwards advances over the *Os Ileum* to the ſide of the iliac muſcle, and its tendon joins to that of this

this muſcle, to terminate together at the *Trochanter minor*. This muſcle is ſometimes accompanied with another pretty like it, but ſmaller. This is called the *Pſoas minor*, which I have before deſcribed.

The *Iliacus* has its fixed adheſions at the internal ſurface of the *Os Ileum*, advancing to its creſt and anterior ſpines, and even to the *Os ſacrum*; its tendon, which is conſiderable, unites with that of the *Pſoas*, and both terminate at the *Trochanter minor*. This muſcle alſo adheres by many fleſhy fibres to the parts adjacent to this eminence.

The *Pectinæus* has its fixed adheſions at the ſuperior part of the *Pubis*, near its joining with the *Os Ileum*, and terminates a little above the *Trochanter minor*.

The *Gluteus major* has its fixed adheſions ſomewhat poſteriorly in the external ſurface of the *Os Ileum*, at the lateral part of the *Os ſacrum* and *Coccyx*. It alſo adheres in all the extent of two ſtrong ligaments, which from the *Os ſacrum* come to the Spine and the tuberoſity of the *Iſchium*. This muſcle then paſſes over the *Trochanter major*, and terminates four fingers breadth below at the poſterior part of the *Femur*.

The *Gluteus medius* has its fixed adheſions in the internal ſurface of the *Os ileum*, from its anterior and ſuperior ſpine to the iſchiadic groove, below the *Gluteus major*, and terminates by a ſhort and thick tendon at the ſuperior and external part of the *Trochanter major*.

The *Gluteus minor* has its fixed adheſions at the middle and inferior parts of the *Os ileum*, and at the portion of the orbicular ligament of the *Femur* which correſponds to it, and terminates by a ſtrong tendon at the anterior part of the ſuperior edge of the *Trochanter major*.

The *Triceps* is ſo called becauſe it has three heads, which are generally called three muſcles, each of

which is called *Triceps*, and which are diſtinguiſhed into ſuperior, middle and inferior.

The *Triceps ſuperior* has its fixed adheſions by a ſtrong tendon at the anterior and ſuperior part of the *Pubis*, joining its ſymphyſis, and running obliquely to the internal part of the *Femur*, terminates by its fleſhy portion at the middle and poſterior part of that bone.

The *Triceps Media* has its fixed adheſions at the anterior part of the *Pubis*, immediately below the *Triceps ſuperior*, and alſo terminates at the poſterior part of the *Femur* above the *Triceps ſuperior*.

The *Triceps inferior* has its fixed adheſions anteriorly at all the branch of the *Iſchium*, and at a portion of its tuberoſity, and terminates poſteriorly at the oſſeous line of the *Femur* from the *Trochanter minor* to the *internal Condyle*, at which it terminates by a pretty ſtrong tendon.

The *Pyriformis* or *Pyramidalis*, has its fixed adheſions at the lateral internal part of the *Os ſacrum*, near its joining with the *Os ileum*, and paſſing under the *Iſchiadic Groove* to which it alſo adheres, it terminates at the internal lip of the ſuperior edge of the *Trochanter major*.

The *Geminus ſuperior* has its fixed adheſions externally at the ſpine of the *Iſchium*, and terminates at the ſuperior and internal part of the *Trochanter major*.

The *Geminus inferior* has its fixed adheſions at the poſterior edge of the tuberoſity of the *Iſchium*, and alſo terminates at the ſuperior and internal part of the *Trochanter major*. Theſe two muſcles alſo adhere in their road to ſome parts of the Iſchium, and of the orbicular ligament of the *Femur* which correſponds to them, being united to each other as it were by a particular membrane which forms a ſheath, in which the tendon of the *Obturator internus* is lodged.

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The *Obturator internus* has its fixed adheſions internally at the membrane which cloſes up the *Foramen ovale*, and almoſt at all the circumference of that hole, advancing to the ſpine of the *Iſchium*; and its tendon paſſes thro' a *Sinuoſity* formed between the ſpine and the tuberoſity, over which ſinuoſity it forms a flexure, and afterwards running from behind forwards, terminates at the ſuperior and internal part of the *Trochanter major*. The tendon of this muſcle, from its paſſage thro' the ſinuoſity to its inſertion, is included in the ſheath formed by the membrane which unites the *Gemini*.

The *Quadratus* has its fixed adheſions at the lateral external part of the tuberoſity of the *Iſchium*, and terminates poſteriorly between the two *Trochanters*, advancing a little towards the external ſurface of the *Femur*.

The *Obturator externus* has its fixed adheſions at the external ſurface of the membrane which ſhuts up the *Foramen ovale*, and at the circumference of that hole. Its tendon paſſes thro' the ſinuoſity formed externally above the tuberoſity of the *Iſchium*, and running a little from above downwards, and from within outwards, paſſes behind the neck of the Femur, in order to terminate at the ſuperior part of the cavity of the *Trochanter major*.

The muſcle commonly called *Faſcia lata* has its fixed adheſions anteriorly at the external lip of the creſt of the *Os ileum*, by a beginning partly fleſhy and partly aponeurotic. The fleſhy body of this muſcle, which is not much more than five fingers breadth in length, and about two or three in breadth, being lodged between the two laminæ of an aponeuroſis, in which this muſcle loſes itſelf by a great number of very ſhort tendinous fibres. 'Tis the great extent of this aponeuroſis which has laid a foundation for calling this muſcle the *Faſcia Lata*, tho' this name ſeems rather to belong to the aponeuroſis

than to the muſcle itſelf. This aponeuroſis is fixed anteriorly to the external lip of the creſt of the *Os ileum*, from its anterior and ſuperior ſpine to about the middle of this creſt; it adheres afterwards to the Trochanter major, and poſteriorly near the middle of the Femur to the ſuperior part of the *Fibula*, continues all along the *Tibia* adhering to its creſt, and at laſt terminates in the inferior part of the Fibula. in this paſſage the aponeuroſis covers the muſcles which correſpond to it, namely, a great portion of the *Gluteus medius* and *major*, and all the muſcles which lie along the thigh, principally thoſe of its lateral external part, and thoſe which lie anteriorly along the leg, between the *Tibia* and *Fibula*. This aponeuroſis receives a great number of fibres from the muſcles which it covers, but eſpecially from the *major* and *medius Gluteus*, and from the ſhort head of the *biceps* muſcle of the leg, from thoſe called *Fibulares*, from the *Tibialis anterior*, and from the *Extenſor longus* of the toes, with which muſcles this aponeuroſis is as it were confounded.

'Tis proper to obſerve, that with reſpect to moſt of theſe muſcles, this aponeuroſis furniſhes them with partitions which ſeparate them from each other. The ſame thing is obſerved with reſpect to the aponeuroſis which covers the muſcles of the fore arm, and principally thoſe which lie externally between its two bones.

This is an obſervation which young ſurgeons ought to make, and which ought to induce them not to ſpare theſe aponeuroſes when they ought to be cut, as in deep abſceſſes, gun-ſhot wounds, *&c.* for they ought in all ſuch caſes, not only to cut theſe aponeuroſes according to their length, but alſo cut them croſswiſe, and even carry their inciſions to theſe partitions which penetrate the interſtices of the muſcles, and that more or leſs, according to the circumſtances of the diſeaſe. What I have ſaid of the

the aponeuroſes of the muſcles of the extremities, ought to be applied to thoſe of the reſt of the body, which ought not to be ſpared in caſes where there is a neceſſity of cutting them.

Of the Muſcles of the Leg.

The leg which, as I have ſaid in the oſteology, is compoſed of the *Tibia* and *Fibula*. It performs its motions by the articulation of the *Tibia* with the *Femur*. Theſe motions are not confined to flexion and extenſion, ſince the leg when half bent can alſo perform ſmall rotations internally and externally. All theſe motions are performed by the action of ten muſcles, four of which ſerve for extenſion, and ſix for flexion: the extenſor muſcles are the *Gracilis anterior*, the *Vaſtus internus*, the *Vaſtus externus*, and the *Cruralis*; the flexors are the *Biceps*, the *Semi-nervoſus*, the *Semi-membranoſus*, the *Gracilis internus*, the *Sartorius*, and the *Poplitæus*.

The *Gracilis anterior* has its fixed adheſions at the *Os ileum* by a tendon with two branches, one long and one ſhort: this laſt ariſes from its anterior and inferior ſpine, and the long, which is a little incurvated, comes from the inferior and external part of this bone, immediately above the edge of the *cotyloide* cavity, and is about two fingers breadth in extent. This tendon loſes itſelf in the body of the muſcle which deſcends anteriorly along the thigh, and when it reaches its inferior part, it communicates with the *Muſculus Cruralis* and the two *Vaſti*; and all theſe terminate at the *Rotula* and *Tibia*, as I ſhall afterwards ſhew.

The *Vaſtus internus* has its fixed adheſions along the internal ſurface of the *Femur* from the *Trochanter minor*, above which it advances very near to the internal *Condyle*. This muſcle is joined in all its length with the *Triceps inferior* by an *Aponeuroſis*,

which is perforated in its inferior part for the paſſage of the crural artery and vein.

The *Vaſtus externus* has its fixed adheſions along the external ſurface of the *Femur*, from the great *Trochanter* to very near the external condyle.

The *Cruralis* has its fixed adheſions all along the anterior ſurface of the *Femur*, and when it reaches the inferior part of that bone, it is loſt by ſeveral aponeurotic fibres in the poſterior part of the tendon of the *Gracilis anterior*, which terminates at the whole ſuperior part of the Rotula. Some fibres of this tendon are ſeparated from the reſt to cover the external ſurface of the *Rotula*, to which they adhere ſo cloſely that they ſeem to ſerve as a Perioſteum to it, and at laſt loſe themſelves in the ligament which joins it to the *Tibia*. As for the two *Vaſti*, they furniſh in their inferior part a great number of aponeurotic fibres, which unite laterally with the tendon of the *Gracilis anterior*, and continuing their road, adhere alſo to the lateral parts of the *Rotula*, advancing even to its ligament, and at laſt terminates at thoſe portions of the *Tibia* which correſpond to them.

'Tis to be obſerved, that the *Cruralis* furniſhes ſome fibres which adhere to the capſular membrane of the articulation common to the *Rotula*, the *Femur*, and the *Tibia*. The principal uſe of theſe fibres is to hinder this membrane from being pinch'd in the motions of the articulation. The ſame is to be ſaid of the fibres of the *Subſpinalis*, the *Supra-ſpinalis*, the *Rotundus minor*, and the *Sub-ſcapularis* muſcles of the arm, which adhere to the capſulary membrane of the articulation, and of the fibres of the extenſor muſcles of the fore arm, *&c.*

The *Biceps* is compoſed of two portions or heads of unequal length; the longeſt has its fixed adheſions poſteriorly at the tuberoſity of the *Iſchium*, and the ſhorteſt at the external ſide of the oſſeous line of the

the *Femur*, four fingers breadth, or thereabout, above its condyles. This laſt alſo adheres to the aponeuroſis of the *Faſcia lata*, which in that part forms as it were a partition between the *Biceps* and the *Vaſtus externus*. Theſe two portions reunite afterwards to form but one body of a muſcle, from which there ariſes a tendon, which terminates at the ſuperior and external part of the *Fibula*.

The *Sartorius* has its fixed adheſions by a very ſhort tendon, at the anterior and ſuperior ſpine of the *Os ileum*; it afterwards advances obliquely on the fore part of the thigh, to reach the interior part of the knee, whence it runs to the internal ſurface of the *Tibia* where it terminates, advancing to its creſt, a little below its tuberoſity. The body of this muſcle is included in a kind of ſheath formed by the expanſion of the *Faſcia lata*, and its inferior tendon alſo appears to be as it were bridled by an aponeurotic ſheath, which keeps it ſecure in its oblique courſe.

The *Gracilis internus* has its fixed adheſions at the edge of the inferior branch of the *Os pubis* near its *Symphyſis*, and deſcends along the internal part of the thigh. Its tendon runs obliquely to the internal ſurface of the *Tibia*, where it terminates in advancing to its creſt, immediately below the tendon of the *Sartorius*.

The *Semi-nervoſus* has its fixed adheſions at the tuberoſity of the *Iſchium*, and confounds its fibres with the long head of the *Biceps* for about three fingers breadth; it afterwards runs along the poſterior part of the thigh, and towards the internal part of the knee, above which it forms a round and ſlender tendon, which advances in growing broader towards the upper part of the internal ſurface of the *Tibia*, at which part it terminates in continuing to its creſt, about an inch and an half below its tuberoſity, and immediately under the tendon of the *Gracilis inter-*

nus. The tendons of these three muscles unite with each other at the *Tibia*, where they form a common aponeurosis, which runs obliquely over the internal surface of this bone to about three or four fingers breadth below its tuberosity.

'Tis to be observed in the amputation of the leg, not to cut the aponeurotic expansions either of the flexor or extensor muscles, which may be avoided by performing this operation four fingers breadth at least below the tuberosity of the *Tibia*. The stump which remains, will by this means have a sufficient length to find a solid support on the wooden leg, and by this precaution we will avoid an artery* which runs obliquely into the thickness of the *Tibia* to be distributed to the marrow, and of which the Hemorrhage might have incommoded the surgeon who should happen to be unacquainted with the particular road of this vessel.

The *Semi-membranosus* has its fixed adhesions at the tuberosity of the *Ischium* by an aponeurotic tendon, it descends posteriorly along the thigh, and terminates at the posterior and inferior part of the top of the *Tibia*.

The *Poplitæus* has its fixed adhesions by a very short tendon at the exterior edge of the external condyle, and running obliquely from above downwards, and from without inwards, terminates at the posterior and superior part of the *Tibia*. This muscle in its passage adheres to the capsular membrane of the articulation. 'Tis to the alternate action of the *Biceps* and *Poplitæus* that we ought to ascribe the small rotations which the leg makes when half bent, namely, the rotation outwards to the

* 'Tis pitty that Mr. *Cheselden*, and other writers of anatomy and surgery, never mentioned this artery in all their works; if they had, it might have made us surgeons of more esteem.

biceps

biceps muſcle, and that which the leg makes inwardly to the *Poplitæus*.

It is to be obſerved, that the functions of the muſcles of the leg are not confined to the ſimple motions commonly aſſigned to them, which we will eaſily comprehend, if after having well examined their direction, and the particular diſpoſition of their adheſions, we recollect what has been ſaid in general of the action of thoſe muſcles which only adhere to the bones. The *Gracilis anterior*, for example, on account of its adheſion to the *Os ileum*, ſeems capable of bending the thigh independently of its uſe for the extenſion of the leg. The *Sartorius*, beſides the flexion of the leg in which it has a ſhare, ſerves alſo to the demi-rotation of the thigh outwards, whether it is extended or bent. When it performs this demi-rotation while the leg is bent, it makes this leg croſs the other, as is obſervable in the ſituation of taylors when at work: and 'tis from this circumſtance, that this muſcle has received the name of *Sartorius*.

Of the Muſcles of the Foot.

The foot is joined to the leg by means of the *Aſtragalus*, whoſe articulation with the *Tibia* only permits to the foot *Flexion* and *Extenſion*, its lateral motions being performed on the articulation of the *Aſtragalus* with the ſcaphoide bone, and on that of the *Calcaneum* with the *Cuboide*, as I have elſewhere obſerved. We reckon eight muſcles for the performance of theſe motions, namely, two for *Flexion* and ſix for *Extenſion*: the *flexor* muſcles are the *Tibialis anterior* and the *Fibularis brevis*; the *Extenſors* are the two *Gemini*, the *Solaris*, the *Plantaris*, the *Tibialis poſterior*, and the *Longus fibularis*. As for the lateral motions of the foot, that is to ſay, its *Adduction* and *Abduction*, it is thought that they depend principally on the alternate action of the *Tibia-*

lis poſterior and the *Fibularis longus*; and we aſcribe the *Adduction* to the *Tibialis poſterior*, and *Abduction* to the *Fibularis longus*.

The *Tibialis anterior* has its fixed adheſions at the ſuperior and middle parts of the external ſurface of the *Tibia*, in advancing to its creſt, at the interoſſeous ligament, and at the internal ſurface of the aponeuroſis which covers this muſcle. Its tendon paſſes under a particular annular ligament, and terminates at the internal ſurface of the firſt cuneiform bone, and at the poſterior part of the firſt bone of the *Metatarſus*.

The *Peronæus brevis* or *anterior* has its fixed adheſions anteriorly at the middle and inferior parts of the Fibula, and alſo at the internal ſurface of the aponeuroſis which covers this muſcle: its tendon paſſes behind the *Malleolus externus*, a-croſs an annular ligament which is common to it with the *Peronæus major*, and terminates at the tuberoſity of the fifth bone of the Metatarſus.

The two *Gemini*, called alſo *Gaſtrocnemij*, have their fixed adheſions poſteriorly at the *Femur* immediately above its condyles, and form about the middle of the leg a common aponeurotic tendon, which unites with that of the *Muſculus Solaris*, as I ſhall afterwards ſhew.

The *Solaris* has its fixed adheſions poſteriorly at the ſuperior and almoſt middle part of the *Tibia* and *Fibula*, and terminates by a very ſtrong and pretty broad tendon, which is cloſely united with the common tendon of the *Gemini*, to form in conjunction the tendon of *Achilles* or cord of *Hippocrates*, which adheres to the poſterior part of the *Calcaneum*.

The *Plantaris* is a muſcle whoſe fleſhy body is little more than two inches long, and one broad: it has its fixed adheſions at the external condyle of the Femur, and its tendon, which is flat and very ſlender,

der, ſlips between the two Gemini and the Solaris, and joins the internal edge of the tendon of *Achilles* as far as its inferior part, where it is confounded with that tendon, and terminates poſteriorly at the Calcaneum. The *Plantaris* has no diſtinct communication with the aponeuroſis which covers the ſole of the foot.

Tho' the tendon of *Achilles* is very ſtrong, yet it is often broken, without any hurt in the ſkin, by violent extenſions of the foot, as in leaping, dancing, and other exerciſes of a ſimilar nature*. The ſame thing happens to the tendon of the *Gracilis anterior* a little above the *Rotula*, and to the ſtrong tendon which fixes the Rotula to the Tibia, and that by violent efforts, during which theſe parts have ſuffered extreme tenſions. It may even be ſaid, that tranſverſe fractures of the Rotula are often produced by the ſame cauſe. Mr. *Petit* ſays, he has ſeen many *Rotulas* thus bruiſed by falſe ſteps and efforts, without the knees being ſtruck by any body whatever. Mr. *Boudon*† aſſures me, that he has ſeveral times ſeen the Rotula broken by a ſimilar cauſe, and Mr. *Ruyſch*§ alſo ſays that he has ſeen the ſame.

The *Tibialis poſterior* has its fixed adheſions at the ſuperior and middle parts of the *Tibia* and *Fibula*. Its tendon paſſes behind the *Malleolus internus*, a-croſs a particular annular ligament, and terminates at the inferior part of the Scaphoide.

The *Peronæus longus* or *poſterior* has its fixed adheſions at the ſuperior and middle parts of the Fibula. Its tendon paſſes behind the Malleolus externus, by an annular ligament which is common to it

* See *Paræ.* lib. 10. cap. 42, and Petit in his traité des maladies des os, 1736.

† Surgeon major of the Hotel Dieu of *Paris*.

§ *Ruyſch*'s obſ. med. chirurg. 1691.

with

with the Peronæus brevis, and reaches to the ſinuoſity of the Cuboide, to terminate poſteriorly at the inferior and external part of the firſt bone of the *Metatarſus* and of the *Os Cuneiforme majus*.

Of the common Muſcles of the Toes.

The toes can move in as many directions as the fingers. The muſcles which perform theſe different motions have alſo been diſtinguiſhed into common and proper, both of which have alſo been called *Flexors*, *Extenſors*, *Adductors* and *Abductors*, according to their different functions.

We generally reckon two common *Flexors*, one ſhort and one long, two *Extenſors*, alſo diſtinguiſhed into long and ſhort; and we look upon the *Lumbricales* and *Interoſſei inferiores*, as the *Adductors* of the toes, and the *Interoſſei ſuperiores* as their *Abductors*.

Before we can diſcover the firſt of the common *Flexors*, called the *Brevis*, we muſt remove a very ſtrong aponeuroſis under which it is concealed; it is called the *Aponeuroſis plantaris*, and is cloſely adherent to the inferior part of the tuberoſity of the *Calcaneum*, continues afterwards along the middle of the ſole of the foot, furniſhing fibres to its lateral parts as well as to the ſkin and *Flexor brevis*, with which it appears to confound itſelf at its beginning, and terminates at laſt by four portions at the anterior and inferior parts of the four laſt bones of the *Metatarſus:* theſe portions are perforated for the paſſage of the flexor tendons of the toes.

The *Flexor brevis* has its fixed adheſions at the anterior and inferior part of the tuberoſity of the *Calcaneum*, and runs forward, dividing itſelf into four fleſhy portions, each of which furniſhes a tendon, which terminates at the inferior and middle parts of the ſecond phalanx of the four laſt toes.

Theſe

Theſe tendons are perforated, as well as thoſe of the ſublimis of the hand.

The *Flexor longus* has its fixed adheſions poſteriorly almoſt all along the *Tibia*. Its tendon paſſes behind the *Malleolus internus* by a particular annular ligament, and reaches the ſole of the foot, where it joins a fleſhy maſs which comes from the middle and inferior part of the Calcaneum, and which is looked upon as a ſecond portion of this muſcle. This ſame muſcle terminates afterwards by four tendons at the third phalanx of the four laſt toes. Theſe tendons paſs thro' the fiſſures of the tendons of the *Flexor brevis*, and are included in a ſheath, which is common to them, and which is diſpoſed almoſt in the ſame manner with that which includes the tendons of the *Sublimis* and *Profundus* in the hand.

The *Extenſor longus* has its fixed adheſions anteriorly at the interoſſeous ligament, and all along the internal ſurface of the *Fibula*; it alſo adheres to the *Tibia* by its ſuperior part. This muſcle paſſes under the external and common annular ligament, where it produces five tendons, four of which loſe themſelves along the ſuperior part of the four laſt toes, and the fifth terminates at the poſterior and ſuperior part of the laſt bone of the *Metatarſus*.

Some anatomiſts make a particular muſcle of the fleſhy portion which correſponds to this laſt tendon; they reckon it among the flexors of the foot, and call it *Peronæus minor*, on account of its adheſion to the *Peroneum*.

The *Extenſor brevis* has its fixed adheſions at the anterior and ſuperior part of the *Calcaneum*, and divides itſelf into four fleſhy portions, which produce as many tendons, which run obliquely from without inwards to the phalanges, namely, the firſt to the firſt of the great toe, and the three others unite with thoſe of the *Extenſor longus*, to run along the *Pha-*

langes

langes of the three following toes. The tendons of the *Brevis* paſs under the tendons of the *Extenſor longus*, which they croſs in ſome meaſure.

The *Lumbricales* or *Vermiculares* are four in number, ariſe from the tendons of the *Flexor longus*, and terminate by as many ſmall tendons at the firſt Phalanges of the four laſt toes, almoſt in the ſame manner as in the hand.

The *Interoſſei* are generally no more than ſeven in number, namely four ſuperior and three inferior: the firſt of the ſuperior has its fixed adheſions along the internal ſurface of that bone of the *Metatarſus* which ſupports the ſecond toe, and terminates by a ſlender tendon at the interior ſide of the firſt Phalanx of this toe, to bring it near to the firſt.

The three others adhere by many fleſhy fibres to the internal ſurfaces of the three laſt bones of the *Metatarſus*, and by ſome to the external ſurfaces of the ſecond, third and fourth; and they alſo terminate by ſlender tendons at the external ſide of the firſt Phalanx of the ſecond, third and fourth toe, to ſeparate them from the firſt.

The firſt of the *Interoſſei inferiores* has its fixed adheſions along the internal and inferior part of the third bone of the *Metatarſus*, and terminates at the interior ſide of the firſt phalanx of the third toe, to bring it towards the firſt.

The *ſecond* correſponds to the fourth bone of the *Metatarſus*. It has its fixed adheſions along the internal and inferior part of this bone, and at the adjacent ligaments, and terminates at the interior ſide of the firſt phalanx of the fourth toe, to bring it towards the firſt.

The *third* has its fix'd adheſions along the internal and inferior part of the fifth bone of the *Metatarſus*, and terminates in the interior ſide of the firſt *phalanx* of the laſt toe to carry it towards the firſt.

This

This laſt *Interoſſeus* has moſt of its fibres confounded with thoſe of the muſcle of the ſmall toe call'd *Hypothenar*.

From what I have ſaid it is evident, that of the four ſuperior interoſſeous muſcles, the firſt is the *Adductor* of the ſecond toe, and that the ſecond, third and fourth are the *Abductors* of the ſecond, third and fourth toes; and that of the three inferior *Interoſſei*, the firſt is the *Adductor* of the third toe, the ſecond the *Adductor* of the fourth, and the third the *Adductor* of the little toe.

Of the proper Muſcles of the Toes.

There are none of the toes, except the great and the little, which have proper muſcles.

The great toe has five proper muſcles, one *Flexor*, one *Extenſor*, one *Adductor* called *Thenar*, and two *Abductors*, namely, the *Anti-thenar* and the *Quadratus*.

The *Flexor* has its fixed adheſions poſteriorly at the middle and inferior parts of the *Fibula*; its tendon runs obliquely under the *Malleolus internus*, in order to reach a canal which is at the upper part of the internal ſurface of the *Calcaneum*, where this tendon paſſes thro' a particular annular ligament, and continuing its road under the ſole of the foot, it joins the *Flexor longus communis* of the toes; and after having communicated with that muſcle, it terminates at the inferior part of the laſt phalanx of the great toe. The tendon of this muſcle is included in a membranous ſheath, as well as the flexors of the other toes.

The *Extenſor* has its fixed adheſions at the middle and inferior parts of the Fibula, at the interoſſeous ligament; its tendon paſſes under the common annular ligament, ſlips into a membranous ſheath, which accompanies it to the baſe of the firſt phalanx

of the great toe, where it adheres, and continues to the root of the nail.

The *Thenar* has its fixed adheſions at the internal part of the *Calcaneum*, to that of the *Scaphoide*, and of the *Cuneiforme majus*, and alſo at the internal and inferior part of the firſt bone of the *Metatarſus*, and terminates at the poſterior and internal part of the firſt phalanx of the great toe. This muſcle may be diſtinguiſhed into three portions.

The *Anti-thenar* has its fixed adheſions at the poſterior and inferior parts of the ſecond, third and fourth bones of the *Metatarſus*, and of the adjacent ligaments, and terminates at the poſterior and external part of the firſt phalanx of the great toe, and at the moſt contiguous *ſeſamoide* bone.

The *Quadratus*, by ſome called *Tranſverſalis* on account of its ſituation, is laid tranſverſly along the anterior and inferior part of the four laſt bones of the *Metatarſus*, in the part where they are articulated with the toes; and it has its fixed adheſions at the ligaments which join theſe bones together, by three beginnings or very ſlender fleſhy portions, of different bulks, and it terminates at the poſterior and external part of the firſt phalanx of the great toe, confounding itſelf with the *Anti-thenar*.

Along the ſole of the foot externally we diſcover a fleſhy maſs, of which we generally make but one muſcle called *Hypothenar*, which is looked upon as the Abductor of the little toe. However, if we examine it carefully, we find that it makes three muſcles, which Mr. *Winſlow* calls *Metatarſian*, *Parathenar major*, and *Parathenar minor*. The *Metatarſian* has its fixed adheſions along the inferior part of the *Calcaneum*, running a little to the external part of the ſole of the foot, where it terminates by a ſtrong tendon at the poſterior and external part of the laſt bone of the Metatarſus. The adheſion of

this muſcle to the *Calcaneum* is above that of the *Flexor brevis communis* of the toes, and it is almoſt wholly covered by an aponeuroſis, whoſe fibres reunite to form the tendon of this muſcle.

The *Para-thenar major* has its fixed adheſions along the inferior and external part of the *Calcaneum*, from its tuberoſity to its anterior part, being confounded with the *Metatarſian*, and it afterwards ſlips under the firſt bone of the *Metatarſus*, to terminate by a pretty ſtrong tendon at the poſterior and external part of the firſt phalanx of the little toe.

The *Para-thenar minor* has its fixed adheſions along the inferior and ſomewhat external part of the laſt bone of the Metatarſus, and terminates by a pretty ſtrong tendon at the inferior and ſomewhat external part of the firſt phalanx of the little toe.

The *Metatarſian* runs along the fifth bone of the *Metatarſus* to the ſole of the foot, alſo carries along with it the fourth, which is cloſely united to it, and thus ſhriveling up the ſole of the foot, renders it more arched. The *Tranſverſalis* ſeems to help the *Metatarſian* in this contraction of the foot, as well as the *Anti-thenar*.

The *Para-thenar major* ſerves particularly to ſeparate the ſmall toe from the four others, and the *Para-thenar minor* ſerves to bend the firſt phalanx of this toe. Theſe muſcles alſo ſerve to arch the ſole of the foot, which is very neceſſary when we intend to climb up any ſteep place, by fixing our feet ſecurely.

The End *of the* Myology.

ABSTRACT OF ANATOMY.

SECTION II.

Of SPLANCHNOLOGY.

CHAP. I.

Of the general Coverings of the human Body.

IN the general diviſion which I have made of the human body into the trunk, and the branches or extremities, I have ſaid that the trunk comprehended three cavities or venters, diſtinguiſhed into ſuperior, middle and inferior; the firſt is the head, the ſecond the breaſt, and the third which is larger than the other two taken ſeparately, is called the Abdomen, or lower belly. Anatomiſts have given the name of Viſcera to the organs included in the breaſt and abdomen, and tho' they have not given the ſame name to thoſe contained in the head, yet they do not fail to deſcribe them when they treat of the viſcera, ſo that they comprehend the whole under this part of anatomy called *Splanchnology*. I ſhall conform myſelf to this uſage, but before I ex-

amine the internal parts, order requires that I ſhould treat of thoſe which cover the whole body, and which are for that reaſon called its univerſal teguments, or general coverings.

Of theſe the ancients have reckoned five, namely, the Epidermis or ſcarf ſkin, the Dormis or true ſkin, the Panniculus Carnoſus, the Panniculus Adipoſus or the fat, and the common membrane of the muſcles.

The moderns reduce theſe five teguments to two, which are the ſkin and the fat.

ARTICLE I.

Of the Skin.

THE ſkin is a kind of very thick membrane, which covers all the parts of the body. Its thickneſs however varies, being thicker in the head and back than in the face, *&c.* It is not of a texture equally compact, for it is more lax in the hairy part of the head than in the back, where it is more compact.

The moderns have diſcovered, that the ſkin is principally compoſed of four parts.

The firſt or innermoſt is properly called the ſkin. It is compoſed of a ſurprizing texture of tendinous and nervous fibres, interſperſed with a great number of veſſels, moſt of which are lymphatic. This texture yields in all directions, as is obſervable in fulneſs, *&c.* and again recovers its primitive ſtate.

The ſecond part of the ſkin is called the papillary ſubſtance, and is compoſed of ſeveral eminences of different figures, principally formed by the extremities of the nerves diſtributed to the ſkin. Theſe eminences are commonly called the Papillæ of the ſkin, and are eaſily diſcovered about the fingers, the palms of the

the hands, and the ſoles of the feet, after the Epidermis is removed.

The third part of the ſkin is by *Malpighi* called the mucous or reticular ſubſtance; it is ſo cloſely adherent to the *Epidermis*, that theſe two parts may be looked upon as one, the mucous ſubſtance ſeeming to be but the interior part of the Epidermis, which may be called the ſurface of that ſubſtance indurated, and as it were become callous.

The fourth, or outermoſt part of the ſkin, which on account of its ſituation is called *Epidermis*, is a tranſparent membrane, and more or leſs ſlender, there being ſome parts where it is pretty thick, as in the palms of the hands and ſoles of the feet, eſpecially in thoſe who go bare-foot, or work at hard employments. No fibre ſeems to enter the compoſition of the *Epidermis*, and the fineſt injections have not hitherto diſcovered any veſſels in it. The different impreſſions made on this membrane excite no ſenſation.

The whole ſkin is perforated with a ſurprizing number of ſmall holes, called *Pores*. It has alſo apertures known to every body, I mean thoſe of the eyes, the mouth, the noſe, the anus, *&c.*

In theſe large apertures of the ſkin we obſerve, that it does not terminate at the edge or circumference of moſt of theſe openings. The ſkin is reflected to the inſide of the cavities whoſe entrance it has formed, and unites with the membrane which lines them, as is obſervable in the noſtrils and external duct of the ear, where the ſkin runs to line the ſides of that duct as far as the tympanum, and the Epidermis in this part advances over this membrane to cover it, ſo that it there forms a kind of an end of a bag, and the ſkin only forms a kind of duct perforated in its extremity, as I ſhall afterwards ſhew.

In the ſurface of the ſkin we obſerve a great number of lines, more or leſs deep, according to the parts where they are. Theſe are eſpecially obſervable in the palm of the hand, where they are conſiderable; but a greater number of them is obſervable in all the extent of the hand, and it is principally of theſe that I intend to ſpeak.

The lines obſervable at the internal and inferior part of each finger are often turned into ſpirals, and the uſe of all theſe furrows is to cover the pores which are found in them.

Beſides theſe we obſerve certain foldings, which are formed by the whole ſkin, and we diſtinguiſh theſe into two ſorts.

The firſt are thoſe formed by the adheſion of the fleſhy and tendinous fibres of certain muſcles to the texture of the ſkin itſelf; ſuch are the wrinkles of the forehead and eyelids, *&c.*

The ſecond are thoſe formed by ſome ligamentary or tendinous fibres, which fix the ſkin to the adjacent parts; ſuch are the foldings obſervable at the different joinings of the fingers, *&c.*

In the internal ſurface of the ſkin, and principally of that which covers the face and armpits, we obſerve ſeveral ſmall granulations, commonly called cutaneous glands, and whoſe exterior ducts pierce the ſkin at the ſides of the Papillæ, or in the Papillæ themſelves, according to the obſervations of Mr. *Winſlow*. Theſe glands are diſtinguiſhed into two claſſes. *Steno* and *Malpighi* have called ſome of them *miliary*, and looked upon them as the ſources of the ſweat. Mr. *Valſalva* and Mr. *Morgagni* have called the others *ſebacious*, becauſe they ſeparate an unctuous matter, more or leſs thick. Theſe are principally diſcovered in the ſkin which covers the cranium, behind the ears, in the eyelids, the point of the noſe, *&c.* whence in ſome people

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we eaſily expreſs this matter in the form of ſmall worms. This in general is called the filth of the ſkin.

As for the pores of the ſkin, there are two ſortsof them; ſome are more or leſs perceptible, ſuch as the orifices of the cutaneous glands, and principally thoſe of the ſebacious kind, and thoſe which afford a paſſage for the hair; the others are imperceptible by the naked eye, and can only be diſcovered by a microſcope. Theſe laſt afford a paſſage for the matter of inſenſible tranſpiration, that is, to a fine exhalation, or a kind of very ſubtile ſmoak, which generally eſcapes very imperceptibly thro' the ſmall pores of the ſkin. This is called cutaneous tranſpiration, to diſtinguiſh it from that called pulmonary, or from the lungs, which I ſhall afterwards conſider.

This inſenſible evacuation is made ſimply and without any artifice thro' the ſkin, almoſt in the ſame manner as we ſee the ſmoak riſing from the intrails of a new killed animal. It is a particular and continual diſcharge of the ſeroſity of the blood, thro' the capillary veſſels of the ſkin.

This cutaneous exhalation is rendered ſufficiently ſenſible, when we apply the ends of the fingers or the palm of the hand to a looking glaſs, or any other well poliſhed body, which are by this means forthwith tarniſhed, and as it were covered with a condens'd vapour.

The evacuation made thro' the ſmall pores of the ſkin, and that which continually eſcapes from the lungs, however inſenſible they may appear, are yet ſo conſiderable that they greatly ſurpaſs thoſe made by other outlets, according to the obſervations of *Sanctorius*, a celebrated Italian phyſician; he affirms, that having weighed himſelf with all the circumſtances which could make the evacuation vary, he found that more is diſſipated in twenty-four hours by inſenſible tranſpiration, than the quantity of groſs excrements

excrements diſcharged in fifteen days. This however ought not to be underſtood in ſo general a manner but that there are exceptions to it, for tranſpiration is different according to the age and ſex of people, the heat or coldneſs of the air, and it is much more copious in hot than in cold climates, and in young perſons than in thoſe advanced in years.

It is ſufficiently obvious, that health is never more perfect than when tranſpiration is freely carried on, and that this evacuation can neither be ſuppreſſed nor conſiderably diminiſhed without producing a proportionable alteration in health, for the parts which ought to eſcape by tranſpiration remaining in the blood, muſt neceſſarily change its laudable diſpoſition.

The different effects of mercurial frictions, and the application of medicines to the ſkin, have laid a foundation for believing that beſides theſe different pores, there are alſo others which afford an entrance to the particles ſeparated from theſe medicines; and it is at preſent believed, that theſe laſt apertures correſpond to as many capillary veins.

Various uſes are aſſigned to the ſkin.

1*ſt*. When conſidered as a membrane, it ſerves as a covering to all the parts of the body.

2*d*. It is looked upon as the particular organ of touch, on account of the different nervous Papillæ which enter its compoſition. It is by their means we diſtinguiſh the different tactile qualities of bodies, namely, their hardneſs, ſoftneſs, ſmoothneſs or roughneſs.

As for the Epidermis, it is to be looked upon as very neceſſary to regulate the impreſſions which the Papillæ receive from tactile bodies, and which without its aſſiſtance would prove painful.

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The membrane is alſo thought proper to regulate the evacuations made thro' the pores of the ſkin.

The colour of the ſkin is not the ſame in the natives of different countries; it is white in *England*, *France*, &c. tawny in *Spain*, olive coloured in *Egypt*, and black among the *Moors*, &c. Several anatomiſts have thought that the colour of the ſkin depended on that of the Epidermis, but exact ſcrutineers evince that the Epidermis varies but little in theſe different nations, retaining almoſt in all of them its whitiſh colour; I ſay, almoſt in all of them, for we obſerve that in the *Moors* this membrane is not ſo white as that of the *Europeans*, but of a tawny colour, reſembling that of burnt horn. 'Tis not the colour of the Epidermis which abſolutely determines that of the ſkin, but rather that of the Corpus Mucoſum ſituated below it, as the moſt exact obſervations evince; and if it is true, that the colour of the ſkin depends principally on that of the reticular body, it muſt be alſo granted that the Epidermis which covers it immediately, renders the colour more or leſs delicate according as it is thicker or thinner*.

Of the Hair.

There are hairs on all the parts of the ſkin, except the palms of the hands and the ſoles of the feet. Thoſe which in man cover the chin, and in both ſexes the armpits and the external parts of generation, only appear about the age of puberty, that is to ſay, about fourteen years of age. All the reſt of the hairs accompany birth, and have different names, according to the parts where they are, as thoſe of the head, eyebrows, *&c.*

* See the hiſtory of the academy of ſciences, 1702, and a phyſical explication of the colour of negroes in memoirs of Trevoux, June 1738.

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When that part of the hair which is without the ſkin is examined with a microſcope, it is found tranſparent, and diverſified with ſmall nodes. *Bidloo*, profeſſor of anatomy at *Leyden*, ſays, that branches or ramifications are generally obſerved in it. As for the root of the hair, or that part which is within the ſkin, ſome think that it is hollow or vaſcular, almoſt like the roots of quills. The deceas'd Mr. *Chirac*, firſt phyſician to the king of *France*, who narrowly conſidered this ſubject, and even wrote a treatiſe on it, ſays, he obſerved that the body of a hair of the head is only compoſed of an aſſemblage of filaments, which have their roots implanted in a common capſula, which is common to all theſe filaments, and at the ſame time particular to each hair. In man this capſula is included partly in the ſubſtance of the fat, and partly in the thickneſs of the ſkin, and it appears to be compoſed of two membranes, the external of which is as it were tendinous, and the internal glandular In this are included the roots of the hair, which are continually moiſtened with a liquor filtrated into the capſula itſelf, and this liquor is probably the matter employed for the nutrition and growth of the hair.

Of the Nails.

Every one knows that the nails are thoſe bodies generally tranſparent, of a pretty firm conſiſtence, and of an oval figure, found at the extremities of the fingers and toes. In them we diſtinguiſh two parts, which are called the root and the extremity. Their ſubſtance reſembles that of horn, being like it formed of ſeveral laminæ applied over each other, and cloſely united; theſe laminæ are not equally long, and are ſo arranged that the external are the longeſt, and the internal the ſhorteſt.

Some authors think that the laminæ which compoſe the nails are compoſed of the nervous papillæ

of the ſkin, which are lengthened and indurated in proportion as they approach the extremity of the nail.

The principal uſes of the nails are, 1*ſt*, to guard the extremities of the fingers againſt the impreſſions of hard bodies; and, 2*d*, to lay hold of and ſecure ſuch bodies as would otherwiſe eſcape them, on account of their ſmallneſs.

The nails of the toes have this in common with thoſe of the fingers, that they guard them againſt the impreſſion of hard bodies; and according to ſome, their uſe is alſo to ſtrengthen and ſecure the feet in walking.

ARTICLE II.

Of the Fat.

THE fat is the ſecond general covering of the body: its thickneſs is not the ſame in all perſons, and even varies in different parts of the ſame perſon. There is generally a great deal of it in the face, cheeks, breaſt, abdomen and buttocks, in the ſoles of the feet, and generally in the interſtices of the muſcles; it alſo penetrates the cavity of the abdomen, in order to cover the meſentery, kidneys, *&c.* The parts where little of it is generally found, are the external part of the cranium, the noſe, the external parts of the ears, the ſcrotum, *&c.* And the parts where none of it is found, are the navel, the eyebrows, *&c.*

The moderns have diſcovered that the fat is principally formed of many ſmall membranous cells, ſupported by a membrane which is common to them, and which is called Adipoſe. Theſe Cellules are full of an oleous juice, which paſſing into the blood thro' particular ducts, which *Malpighi* calls adipoſe veſſels, ſerves to diminiſh its acrimony. 'Tis alſo thought that this oleous juice ſerves as nouriſh-

nouriſhment in long faſtings; and laſtly, that it keeps the different muſcles of the body in that ſtate of flexibility which is neceſſary to aſſiſt the frequent motions which they ought to perform.

CHAP. II.

Of the Coverings peculiar to the lower Belly, and of the Epiploon.

IN the demonſtration of the viſcera or internal organs, we generally begin with an examination of thoſe included in the lower belly, I ſhall follow the ſame order in the deſcription I am to give of them.

In the lower belly we are to conſider its regions and its parts; its regions are divided into anterior and poſterior; this laſt is diſtinguiſhed into ſuperior, which we call the Loins, and inferior, which comprehends the Buttocks.

The anterior region is called the Abdomen, and is divided into three other regions, called the *Epigaſtric*, *Umbilical* and *Hypogaſtric:* each of theſe regions is divided into three parts, one middle and two lateral. The middle part of the epigaſtric region is called *Epigaſtrium*, and the lateral parts *Hypochondria.* The middle part of the umbilical region is called the navel, and the lateral parts are by many called the *lumbar regions.*

The Hypogaſtric region is divided into ſuperior and inferior. The middle of the ſuperior Hypogaſtric region retains the name of *Hypogaſtrium*, and the lateral parts are called the *Ilia* or *Flanks:* the middle of the inferior hypogaſtric region is called the *Pubis*, and the lateral parts the *Groins.*

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The epigaſtric region extends from the xyphoide cartilage, to two fingers breadth above the navel.

The umbilical region begins at the end of the Epigaſtric, and terminates two fingers breadth below the navel.

The ſuperior hypogaſtric region begins at the end of the Umbilical, and terminates at the *Pubis*.

As an acquaintance with theſe different regions would be abſolutely uſeleſs, if we did not join to them thoſe of the organs which correſpond to them, I ſhall enumerate theſe organs, after having deſcribed the parts which compoſe the ſides of the lower belly, called containing parts, which are ſo called to diſtinguiſh them from thoſe included in this cavity, which are called contained parts.

We generally divide the containing parts of the lower belly into common and proper; the common are only the general coverings of the body, that is to ſay, the ſkin and the fat; the proper are of different natures, ſome bony, ſome fleſhy, and ſome membranous. In a word, we obſerve that the ſuperior ſide of the lower belly is compoſed of a muſcular partition called the diaphragm, and that its poſterior ſide is compoſed of the vertebræ of the loins, of the *Os Sacrum*, the Coccyx, and ſome adjacent muſcles. The ſuperior ſides of this cavity are common to it with the inferior ſides of the breaſt, and are formed of the falſe ribs, and ſome muſcles ſubſervient to the breaſt, the arms, and lower belly. The inferior ſides are formed by the *Oſſa innominata*, covered both in their external and internal ſurfaces by muſcles belonging to the thigh. The lateral and middle parts of this cavity and all its anterior ſide, from the xiphoide cartilage to the Pubis, are compoſed of muſcles called *Abdominal*. The whole is internally lined with a membrane called the Peritoneum,

neum, and covered externally by the fat and ſkin. I ſhall only here deſcribe the muſcles of the abdomen and the peritoneum, having already mentioned the other parts which compoſe the ſides of the lower belly: we muſt however except the diaphragm, of which I ſhall treat when I deſcribe the lungs.

ARTICLE I.

Of the Muſcles of the Abdomen.

THE muſcles of the abdomen, otherwiſe call'd epigaſtric, are generally ten in number, five on each ſide. They have received different names, either from the direction of the fibres which compoſe them, or from their figure. Thoſe which receive their names from the direction of their fibres are eight in number, four on each ſide, namely, the two oblique, the tranſverſe, and the rectus. There are only two which derive their names from their figures, and theſe are the pyramidals. Theſe ten muſcles are ſeparated from each other, that is to ſay, thoſe on the right from thoſe on the left ſide by a kind of tendinous band called the *Linea alba* or white line, which extends from the xiphoide cartilage to the ſymphyſis of the *Os Pubis*. It ſeems to be formed by the interweaving of the aponeurotic fibres of the oblique and tranſverſe muſcles.

'Tis obſervable, that the linea alba is much broader above the navel than below, and that it diminiſhes in proportion as it approaches the ſymphyſis of the *Os Pubis*. The *Linea alba* is perforated at the navel, and this aperture is called the umbilical ring, which affords a paſſage for the umbilical cord in the *Fœtus*.

The firſt of the abdominal muſcles is called *Obliquus deſcendens*, *Obliquus major*, or *Obliquus externus*. This muſcle is broad, ſlender, fleſhy poſteriorly,

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and aponeurotic at its anterior and inferior part. It is by its aponeuroſis that it loſes itſelf in the *Linea alba*, its fleſhy portion adhering above along the external and inferior lip of the two laſt true ribs, and pretty often of the three laſt, and of all the falſe, by as many fleſhy and angular appendices commonly called digitations, the three or four uppermoſt of which join ſimilar appendices belonging to an adjacent muſcle called *Denticulatus major*, and the inferior correſpond to a ſpecies of particular appendices, formed by another adjacent muſcle called the *Dorſalis major*.

This muſcle afterwards deſcends to the loins without having any connexion with the vertebræ, and then adheres to the external lip of the creſt of the *Os Ileum*, from about its middle to its anterior and ſuperior ſpine, whence this muſcle runs obliquely to the *Pubis* by a broad and ſtrong aponeuroſis, where it terminates in dividing itſelf into two tendinous bands, commonly called pillars, the foremoſt or ſuperior of which paſſing before the ſymphyſis of the *Oſſa Pubis*, terminates at the anterior part of that of thoſe two bones which is on the oppoſite ſide, croſſing the ſimilar pillar of the other *Obliquus major*. The ſecond, called the poſterior or inferior pillar, terminates at the ſuperior part of the *Os Pubis* on the ſame ſide, ſlipping behind the anterior pillar.

The ſpace left between theſe two pillars is commonly called the ring of the *Muſculus obliquus externus*. Its figure is oval, and it is generally about two fingers breadth in length, and about one and an half in breadth. It is alſo fortified in its ſuperior part by ſome aponeurotic fibres of an adjacent muſcle called *Faſcia lata*, to which the Obliquus major joins, from the anterior and ſuperior ſpine of the *Os Ileum* to near the Pubis, as well as to the *Obliquus internus* and the *Tranſverſalis*, which in this place appear as it were confounded with each other, theſe muſcles in

all their courſe having no adheſion to the adjacent bones.

The ring of the Obliquus externus affords a paſſage to the ſpermatic cord in men, and to the ligamentum rotundum of the uterus in women. In women this ring is ſmaller, and even a little lower than in men.

The proper membrane of the Obliquus externus is continued over its ring, which it covers, and even advances over the parts which paſs thro' this aperture.

But beſides the parts which I have ſaid paſs thro' the rings, it happens pretty often that other parts ſlip into them, ſuch as the inteſtines, epiploon, *&c.* a portion of the bladder has been even found to ſlip into them. The tumor which one or another of theſe parts forms in the groin is called an *inguinal Hernia*, which is more frequent in men than in women.

The union of the oblique with the tranſverſe muſcles in their inferior part forms a kind of tendinous cord, which ſome celebrated anatomiſts look upon as a particular ligament, and call it the ligament of *Fallopius* or of *Poupart*. In one part it adheres to the anterior and ſuperior ſpine of the *Os Ileum*, and in another to the Pubis.

Under this tendinous cord paſs the inferior extremity of the iliac muſcle, the tendon of the *Pſoas*, the flexors of the thigh, as alſo the crural veſſels, both artery, vein and nerve, with the fat and membranes which accompany them. The ſpace which affords a paſſage for all theſe parts is commonly called the arch of the muſcles of the lower belly, and thro' it ſometimes falls a portion of the inteſtine or epiploon, which at the top of the thigh forms a hernia called crural, which is very common among women, but rare among men.

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The ſecond oblique muſcle, or the internal, is called *Obliquus minor* or *deſcendens*; at the top it adheres to the edge of the falſe ribs and of the two laſt true ribs, and advances to the Xiphoide cartilage; and below it adheres to the creſt of the *Os Ileum*, as far as its anterior and ſuperior ſpine, between its two lips, advancing a little more poſteriorly than the *Obliquus externus*: it afterwards adheres to the ſuperior part of the *Os Pubis*, and terminates in the *Linea alba* by an aponeuroſis, which is divided into two laminæ or ſmall leaves, one anterior and another poſterior. Theſe two laminæ embrace the *Muſculus rectus*, and form a particular ſheath for it, which is fortified before by its union with the aponeuroſis of the *Obliquus externus*, and behind with that of the *Muſculus tranſverſalis*.

The *Muſculus tranſverſalis* at its upper part adheres to the edge of the falſe ribs, of the two laſt true ribs, and to the Xiphoide cartilage; and at its inferior part to the internal lip of a great portion of the creſt of the *Os Ileum*, and to the ſuperior part of the *Os Pubis*. It is fixed poſteriorly by a pretty ſtrong aponeuroſis, not only to the tranſverſe apophyſes of the three firſt vertebræ of the loins, but alſo to the ſpines of theſe ſame vertebræ. The portion of the *Muſculus obliquus internus* which correſponds to this aponeuroſis, is ſo united to it that it ſeems to be confounded with it. Laſtly, this muſcle terminates in the *Linea alba* by a broad aponeuroſis, which is cloſely united with the poſterior lamina of that of the *Obliquus internus*.

Theſe two muſcles in their inferior part leave no aperture for the paſſage of the ſpermatic cord in men, or of the *Ligamentum rotundum uteri* in women; for we obſerve, that both paſs under the laſt fibres of theſe two muſcles.

The *Muſculus rectus* at its upper part adheres to the inferior and external part of the *Sternum*, to the

Xiphoide cartilage, to the three laſt true ribs, and to the firſt of the falſe, by as many fleſhy appendices; and below, to the ſuperior part of the *Os Pubis* by a flat tendon. In that part of the *Rectus* which runs from the Xiphoide cartilage to the navel, we are to conſider three kinds of tendons, which unequally croſs the anterior part of this muſcle, and divide it into four portions. We ſometimes find ſome of theſe tendons which penetrate the whole thickneſs of this muſcle; theſe are generally called the tendinous interſections of the *Muſculus rectus*, or its enervations, to which the ſheath of this muſcle is ſtrongly adherent.

In the poſterior part of this muſcle we diſcover ſeveral veſſels diſtributed, the principal of which are its arteries and veins. The artery diſtributed to its ſuperior part is a continuation of that which is called *Mammaria interna*, and which comes from the ſubclavian. That obſervable in its inferior part is called the epigaſtric artery, which comes from the *Iliacus externus*, immediately at its paſſage under the arch of the muſcles of the lower belly, whence it runs obliquely from below upwards, paſſing behind the ſpermatic cord in men, and the *Ligamentum rotundum uteri* in women, and is afterwards diſtributed to this muſcle, by forming an anaſtomoſis with the mammary artery. Theſe arteries are accompanied with as many veins of the ſame name, which alſo communicate with each other by their ramifications.

The ſheath of the Muſculi recti being opened, we at their inferior part perceive thoſe muſcles which from their figure are called pyramidal. They are by their broadeſt portion fixed to the ſuperior and anterior portion of the Os pubis, and terminate by ſeveral ſmall tendons which run along their lateral internal part, and by another found at their points, at the parts of this ſheath which correſpond to them.

them. The pyramidal muſcles are not found in all ſubjects, ſince in ſome, theſe two muſcles are entirely wanting, and in others only one of them.

The navel, properly ſpeaking, is no more than a cicatrix of the ſkin, and the extremity of the cord of thoſe veſſels which have ſerved for the nouriſhment of the Fœtus, and which have paſſed thro' the aperture of the *Linea alba*, called the umbilical ring, thro' which thoſe parts generally eſcape which form that ſpecies of hernia called *Exomphalos*.

The uſes of the epigaſtric muſcles, or thoſe of the lower belly, are diſtinguiſhed into common and proper. The uſes common to all theſe muſcles are not only to ſuſtain the viſcera included in this cavity, but alſo to compreſs them more or leſs at certain times, according to our different exigencies. As the arrangement of theſe muſcles is ſuch, that the fleſhy portion of ſome correſponds to the aponeurotic portion of others, it follows that the compreſſion which they make on the viſcera of the lower belly is more equal. We may conſider this compreſſion at two different times, firſt, in the time of reſpiration, and, ſecond, when reſpiration is ſuſpended.

In the firſt caſe, the viſcera of the lower belly being preſſed during inſpiration by the action of the Diaphragm, and puſhing theſe muſcles outwards, oblige them to ſtretch themſelves. But the Diaphragm being relaxed in expiration, gives place to the viſcera, and then the muſcles ceaſing to be ſtretched, return to their primitive ſtate. From this we perceive, that the muſcles of the lower belly are in this caſe as it were the antagoniſts of the Diaphragm, and we may look upon their action, as well as that of the Diaphragm, as purely mechanical, that is to ſay, depending ſolely on the natural diſpoſition of theſe organs, without any poſitive act of

the will. The compreſſions which the ſtomach and inteſtines receive from the alternate motions of the Diaphragm and muſcles of the lower belly, tho' gentle and light, are nevertheleſs of great aſſiſtance to the digeſtion of the aliments, the diſtribution of the chyle, *&c.*

In the ſecond caſe, that is to ſay, when reſpiration is ſuſpended, which happens when we make any effort, as in going to ſtool, *&c.* the air is retained in the lungs, and the Diaphragm remains in contraction, while the epigaſtric muſcles acting on their ſide, compreſs the organs included in the lower belly, and this more or leſs according to the functions we intend to perform. In this laſt caſe, theſe muſcles become the congenerate or auxiliary muſcles of the Diaphragm; and their actions at this time, as well as that of the Diaphragm, is mechanical and voluntary at the ſame time, that is to ſay, it depends not only on their natural diſpoſition, but alſo on the determination of the will.

As for the proper motions, they principally regard the motions of the trunk, of which mention has been made in the Myology.

ARTICLE II.

Of the Peritonæum.

THE Peritonæum is the laſt of the containing parts proper to the lower belly; it is a kind of ſack, formed of a membrane pretty ſlender, of a ſufficiently compact texture, and yet capable of a conſiderable extenſion, as is obſervable in fat people, *&c.* and of returning to its former ſtate. This ſack includes moſt of the viſcera of the lower belly, but in a particular manner. In different parts of its convexity there are ſeveral depreſſions, which running to the inner ſide of the ſack, there form ſo many

many particular lodges which contain the viſcera found in the inner ſide of the peritonæum, I mean the ſtomach, inteſtines, the liver, the ſpleen, *&c.* The facility with which we diſcover all theſe organs, and even obſerve their colours, tho' they are included in as many particular bags, no doubt proceeds from the thinneſs, or rather tranſparency, of the ſides of theſe bags.

It is alſo to be obſerved, that the ligaments which ſuſtain moſt of theſe viſcera are only formed of ſo many particular foldings of the peritonæum, accompanied with a portion of the cellular and membranous texture, which covers its external ſurface, and which I ſhall afterwards deſcribe; ſuch are the ligaments of the liver, ſpleen, and thoſe of the Uterus, called *Ligamenta lata.* The meſentery itſelf, which is the common ligament of the inteſtines, is alſo formed by a folding of the peritonæum, accompanied with its cellular texture.

The external ſurface of the peritonæum is covered in almoſt all its extent with a particular texture, formed of ſeveral membranous cellules. This is commonly called the cellular texture of the *Peritonæum*, by means of which the Peritoneum is joined to the ſides of the belly, if we except the parts which correſpond to the aponeuroſis of the tranſverſe muſcles, and to that of the Diaphragm, which the peritonæum touches immediately, and to which it is ſtrongly adherent. It is alſo in the thickneſs of this cellular texture that we find the other parts of the lower belly, which we can diſcover without opening the peritonæum. Theſe parts are the kidneys, the ureters, the bladder, the inferior Aorta and Vena Cava, together with the Iliac veſſels; as alſo in men, the ſpermatic veſſels, the Vaſa differentia, the Veſiculæ ſeminales, *&c.* As for the umbilical veſſels, which are a vein and two arteries, we

find them included in ſo many foldings of the *Peritonæum.*

This cellular texture alſo forms four particular elongations, two of which only accompany the crural veſſels, and the other two the ſpermatic veſſels, in men, and the Ligamenta rotunda uteri in women. To theſe we alſo join other two, one of which embraces the neck of the bladder, and the other accompanies the Inteſtinum rectum: beſides, this cellular texture communicates with that which poſſeſſes the interſtices of all our organs, and the fat itſelf is no more than an oleous juice included in the cellules of this texture.

The internal ſurface of the Peritonæum is continually moiſtened by a ſeroſity, which is furniſhed by the almoſt imperceptible holes with which this membrane is perforated in almoſt its whole extent. This lymph is neceſſary, that the inteſtines may move more eaſily, and without exciting any painful ſenſation by their friction.

From what I have ſaid 'tis evident, that the peritonæum not only includes in form of a ſack a great part of the viſcera of the lower belly, but alſo that it ſuſtains them by the particular lodges with which it furniſhes them.

The veſſels diſtributed to the peritonæum are nerves, arteries, and veins, both of the ſanguiferous and lymphatic kind.

The nerves are ramifications of the diaphragmatic, dorſal and lumbar nerves of the Par ſacrum, and of the ſuperior and inferior Plenus meſentericus. In a word, the peritonæum receives its nerves from the parts to which it adheres.

The ſame thing is obſervable with reſpect to the ſanguiferous arteries which come to it from the phrenic, lumbar, meſenteric and hypogaſtric arteries.

The

The ſanguiferous veins follow the courſe of the arteries whoſe name they bear, and are diſtributed in the adjacent trunks, ſome in the Vena cava, and others in the Vena portæ.

As for the lymphatics, the difficulty of ſeeing them does not permit us to trace their courſe.

'Tis to be obſerved, that the peritonæum does not accompany the exterior elongations of its cellular portion. It covers the baſe or beginning of theſe elongations, and it is only in certain hernias that it accompanies them by ſlipping thro' the rings of the *Obliqui externi*, thro' the arch near the thigh, or thro' ſome other aperture; and theſe particular and preternatural elongations of the peritonæum are called herniary ſacks, becauſe they include immediately that portion of the inteſtine or epiploon which forms the hernia: I ſay in certain hernias, for experience evinces, that in thoſe called exomphalos there is no herniary ſack, nor in the hernias formed in conſequence of wounds which penetrate into the cavity of the lower belly, *&c.* This ought to be carefully adverted to by ſurgeons who undertake the operation for theſe hernias.

ARTICLE III.

Of the Situation of the Viſcera of the lower Belly, with Reſpect to its different Regions.

THE Peritonæum being open'd, we diſcover all the Viſcera of the lower Belly, and obſerve, that in the right Hypocondrium are ſituated the great tube of the liver, the gall-bladder, and a portion of the Colon. In the left Hypocondrium are the ſpleen, a portion of the Colon, the epiploon, the bottom of the ſtomach, and the pancreas.

In the epigaſtrium we find the two orifices of the ſtomach, with part of its bottom, the *Duodenum*, a

portion of the pancreas, the ſmall lobe of the liver, a part of the colon and epiploon, the trunk of the Vena portæ, and of the *Vena cava inferior*, and that of the aorta, with its diſtribution into cœliac and ſuperior meſenteric, and laſtly, the *Receptaculum Chili.*

In the right lumbar region we find a portion of the *Inteſtinum Cæcum*, the beginning of the Colon, the right kidney, the *Capſula Atribiliaris*, and the beginning of the ureter of the ſame ſide, together with the emulgent veſſels. In the left lumbar region we find a portion of the colon, the left kidney, the *Capſula atrabiliaris*, with the beginning of the ureter on that ſide, and the emulgent veſſels. In the middle umbilical region we find the reunion of the umbilical veſſels, the circumvolutions of the *Inteſtinum jejunum*, a great portion of the meſentery, and the veſſels, both ſanguiferous, nervous, and lymphatic, which run thro' it, and laſtly, the trunks of the inferior Vena Cava and Aorta.

In the right Iliac region are contained the greateſt part of the *Cæcum* with its appendix, the circumvolutions of the *Inteſtinum ileum*, the iliac veſſels, the progreſs of the ureter on that ſide, that of the ſpermatic veſſels in men; and in women beſides theſe parts, we find one of the fallopian tubes, one of the ovaries, and one of the *Ligamenta lata* of the uterus.

In the left Iliac region we find a portion of the *Inteſtinum ileum*, the iliac veſſels, the progreſs of the ureter on the ſame ſide, that of the ſpermatic veſſels in men; and in women, beſides theſe parts, we obſerve the fallopian tube, the ovary, and the *Ligamentum latum uteri* of that ſide.

In the middle part of the ſuperior hypogaſtric region we find a portion of the *Ileum*, the *Rectum*, and the bladder; and beſides theſe, in women,

women, the uterus ſituated between theſe two parts.

In the middle part of the inferior hypogaſtric region we find the external parts of generation, and in the lateral parts are ſeveral lymphatic glands, with the principal trunks of the crural veſſels, whether arteries, veins, or nerves.

The ſituation of the organs included in the lower belly, is not ſo conſtant as not to be ſometimes changed. We may eaſily conceive that the augmentation of the bulk of theſe organs, or the relaxation of the ligaments or bands which fix them to the adjacent parts, muſt induce ſome change with reſpect to their natural ſituation; and this change of ſituation will be proportionable to the augmentation of the bulk of the viſcera, and the relaxation of the ligaments which fix them. The ſtomach has been found to reach the umbilical region, and even below it by the augmentation of its bulk. The ſpleen becoming conſiderably large, has deſcended into the hypogaſtrium, and been taken for a mole*. But what is moſt ſingular in the ſituation of the viſcera of the lower belly and breaſt, is their total tranſpoſition, which ſometimes tho' rarely occurs. The liver has been found in the left hypocondrium, and the ſpleen in the right; the ſuperior orifice of the ſtomach, to the right inſtead of the left ſide: and this change of ſituation was alſo obſerved in the inteſtines, for beſides that the Duodenum correſponded to the ſituation of the Pilorus, which was to the left, the *Cæcum*, which ought to be in the right, was alſo placed in the left. The aorta poſſeſſed the place of the vena cava, being towards the right, and the laſt mentioned vein towards the left.

* See Ger. Blaſij Obſerv. Medic. rarior. Obſ. 14.

The

The aperture of the breaſt alſo ſhewed the ſame change, the point of the heart being turned to the right inſtead of the left. Its right ventricle where the *Vena cava* diſcharges itſelf, correſponded to the ſituation of that veſſel, which was on the left ſide; and the aorta turned its croſs to the right ſide, to continue on the ſame ſide all along the vertebræ of the back and loins. But the aperture of the body is not always neceſſary to know the diſplacement of the viſcera. In a word, ſince we can eaſily know the ſituation of the heart from the ſituation of its point, if it ſhould happen that its motions ſhould be felt on the right ſide, is it not to be preſumed, or rather, is it not abſolutely certain, that in ſuch perſons there is a ſimilar tranſpoſition of the viſcera?

Mr. *Malaval* and Mr. *Foubert* * have aſſured me, that they have found this tranſpoſition of the viſcera, not only with reſpect to thoſe of the lower belly, but alſo thoſe of the breaſt, in a child whom they opened ſome years ago. Mr. *Foubert* having ſome time ſince ſhewed me the liver, I eaſily perceived by the diſpoſition of its lobes that it had been found in the left hypocondrium; for being placed on a table in the ſituation neareſt to that which it had in the body of the child, and afterwards examined in its anterior part, or on the ſide of its ſciſſure, its great lobe with the gall bladder placed on its internal ſurface, lay towards the left inſtead of the right ſide, as it happens in the liver in a natural ſituation, and the ſmall lobe was towards the left.

Mr. *Boyer* [a] and Mr. *Sorbier* [b] have aſſured me, that they ſaw a ſimilar tranſpoſition of the viſcera in the body of a man which they opened.

* Surgeons in ordinary to the King of *France*.

[a] A phyſician of the faculty of *Paris*, and ordinary to the king.

[b] A ſurgeon of *Paris*, and ſurgeon to his majeſty's forces.

See Obſ. Chir. de Saviard, *Paris*, 1702. Thom. Barth. Hiſt. Anat. rarior. Cent. 2. Hiſt. 29.

ARTI-

ARTICLE IV.

Of the Epiploon.

THE firſt part which preſents after the aperture of the peritonæum, is that called the *Epiploon*, and commonly the *Caul*. This is a very thin membrane, generally interſperſed in all its extent with ſeveral pinguious bands, which conceal the principal ramifications of the veſſels diſtributed to its ſubſtance.

The *Epiploon* generally extends from the bottom of the ſtomach to the umbilical region, deſcending however a little lower on the left than on the right ſide, and in all its extent covering the inteſtines which correſpond to it, and inſinuating itſelf into the interſtices left between the ſtomach and inteſtines *.

The figure of the *Epiploon* reſembles that of a bag, whoſe aperture is uppermoſt, and its bottom undermoſt. It is principally compoſed of two laminæ, one anterior and another poſterior. By its anterior laminæ it adheres to the bottom of the ſtomach, to the *Duodenum*, and the *Spleen*, and by its poſterior to the *Colon*. The veſſels of the *Epiploon* come from different ſources; its arteries are furniſhed by the *Cæliac trunk*, its nerves come from the eighth pair and the intercoſtal, and its veins diſcharge themſelves into the vena porta.

In the ſmall curvature of the ſtomach, between its two orifices, there is a membrane very like the *Epiploon*, for which reaſon it is called the ſmall *Epiploon*. It adheres not only to the ſmall curvature of the ſtomach, but alſo in the concave part of the liver to an eminence of that organ commonly called the lobe of Spigelius.

* See Mr. *Petit*'s Mem. de l'Acad. R. des Sciences, 1725.

In

In the concave part of the liver, behind the trunk of the Vena porta, Mr. *Winſlow* has diſcovered a pretty conſiderable aperture, thro' which we can blow into the great and ſmall Epiploon, and inflate them both at the ſame time, if they are not overloaded with fat.

As for the uſes of the *Epiploon*, 'tis not to be doubted but the fat with which it is loaded has the ſame uſes with that diffuſed thro' the whole body, namely, to maintain the flexibility of the fleſhy fibres of the adjacent muſcles; for example, thoſe of the ſtomach, *Colon*, and *Duodenum*, to which it adheres, and by entering the maſs of blood to diminiſh its acrimony, and perhaps, according to the opinion of ſome, to furniſh the different parts of the body with nouriſhment when they cannot have it elſewhere. 'Tis alſo to be added, that the Epiploon aſſiſts the preparation of the bile, by ſupplying the blood diſtributed to the liver thro' the vena portæ with a certain quantity of ſulphureous parts. 'Tis laſtly to be obſerved that the Epiploon, by exactly filling the vacuities left between the ſtomach and inteſtines, renders the compreſſion which theſe different organs muſt receive from the muſcles of the lower belly more gentle and equal, and conſequently more advantageous, both for the digeſtion of the aliments and the diſtribution of the chyle.

CHAP. III.

Of the Organs ſubſervient to the Digeſtion of the Aliments.

THE organs ſubſervient to the digeſtion of the aliments are pretty numerous, and ſome of them are lodged in the mouth, while others comprehend

prehend the whole duct, reaching from the poſterior part of the mouth to the anus.

ARTICLE I.

Of thoſe Organs which are in the Mouth.

THE mouth comprehends that large ſpace which extends from the lips to the vertebræ of the neck. It is divided into two parts, one anterior and another poſterior; the firſt, which extends from the lips to the Uvula, is properly called the mouth; the ſecond, which reaches from the uvula to the vertebræ of the neck, is called the throat or gullet.

In the mouth, beſides the lips which cloſe its entry, we are to conſider the teeth, the gums, a part of the tongue with its anterior ligament, called the *Frænum*, the orifices which come from the ſalivary glands, the uvula, with the fleſhy partition to which it adheres, and laſtly, thoſe glands called *Amygdalæ*.

In the throat are the apertures of the Naſal foſſæ, with the orifices of two ducts, which correſpond in the internal ear, and laſtly, the root of the tongue, with the apertures of two other ducts, one of which correſponds to the ſtomach, and the other to the lungs.

The *Lips* are principally form'd of the extremities of the muſcles ſubſervient to their motion. They contain a great number of blood-veſſels, and are covered with a very fine membrane interſperſed with many nervous papillæ. This membrane is a continuation of that which lines the internal ſurface of the mouth. The union of the lips is call'd their commiſſure or joining.

The teeth are divided, as I have ſaid in the Oſteology, into inciſory, canine, and molary. They are received into as many cavities formed in the

edge of the jaw bone. Theſe cavities call'd ſockets, are lined with the perioſteum, and the teeth are fixed in them by the gums, which are formed of a particular elaſtic texture, covered with the internal membrane of the mouth and interſperſed with a great many blood-veſſels, which give this ſubſtance a red colour.

The *Tongue* is an organ capable of a great number of motions; its ſubſtance is almoſt entirely fleſhy, and it has a root and a point. On its ſuperior ſurface are ſeveral glands, and many nervous papillæ which are covered with a very fine membrane.

The glands which furniſh the ſaliva are pretty numerous. There are ſix of them very conſiderable, three on each ſide. The firſt are call'd *Parotids*, the ſecond *Maxillaries*, and the third *Sublinguals*.

The *Parotids* are ſituated immediately below the ears, and fill that ſpace which is between the angles of the inferior jaw bone and the cartilaginous duct of the ears: Their excretory canal paſſes thro' the middle of the cheek over the external ſurface of the maſſeter muſcle, and comes to perforate the buccinator, in order to open into the mouth, oppoſite to the ſecond or third ſuperior molary tooth about two fingers breadth from the joining of the lips.

The *maxillary Glands* are placed in the internal ſurface of the inferior jaw bone near its angles. The excretory duct which comes from each of theſe glands, opens into the mouth, immediately at the ſide of the anterior ligament of the tongue, by a ſimple orifice.

The *ſublingual Glands* receive their name from their ſituation, which is below the tongue. They diſcharge their contents into the mouth, by ſeveral excretory ducts, whoſe orifices are diſcovered anteriorly, between the tongue and the gums.

There are two other ſalivary glands, ſituated between the maſſeter and buccinator muſcles, and whoſe

whoſe very ſmall ducts open into the mouth oppoſite to the laſt molary teeth. Mr. *Heiſter* calls them molary glands.

Behind the membrane which internally covers the cheeks, the lips, the palate, the partition of the palate, and the uvula, we obſerve ſeveral glandular papillæ which alſo furniſh the ſaliva, by as many very ſhort excretory ducts, which open into the mouth. Theſe glands derive their names from their ſituation, for which reaſon, they are call'd, *buccal*, *labial*, and *palatine*, *&c.*

To all theſe different ſources of the ſaliva, we ought to add the aperture pretty frequently obſervable in the middle of the baſe of the tongue, which ſeveral anatomiſts look upon as the rendezvous of the ducts which come from ſome of the glands of the tongue.

As for the partition of the palate, which ſome call the valve of the gullet, it is a fleſhy and partly glandulous part. This partition is fixed anteriorly very cloſely to the palate, and terminates poſteriorly by four productions in form of pillars or arches, the anterior of which unite at the ſides of the baſe of the tongue; and the two others loſe themſelves in the ſides of the pharynx. Between theſe productions we find on each ſide the orifices of two glands, called the *Amygdalæ* or *Tonſils*, which furniſh a liquor much thicker than the ſaliva.

In the middle of the poſterior edge of the partition we find a body nearly of a conical figure, which appears to be a prolongation of this partition. This is what we call the uvula.

The cavity which is behind the partition, and which advances to the vertebræ of the neck, is, as I have before ſaid, called the throat or gullet.

The orifices of the different ducts, which as I have ſaid are found here, may from their ſituation be diſtinguiſhed into ſuperior and inferior. Of theſe

laſt, the anterior correſponds to the *Trachea arteria* which goes to the lungs, and the poſterior to that called the Œſophagus, which goes to the ſtomach.

The firſt of theſe orifices is called the *Glottis*, and is cloſed when we ſwallow by a kind of valve called the Epiglottis, and the ſecond, properly ſpeaking, is no more than the beginning of the œſophagus.

As for the other apertures obſervable in the throat, and which from their ſituation we may call ſuperior, are four in number, namely, two which communicate with the cavities of the noſe, and are called the poſterior narine apertures, and two others which communicate with the ears, theſe laſt are the extremities of the two ducts known by the name of the Euſtachian tubes.

The tongue is by its root fixed to the Os hyoides, which ſerves as a ſupport to it, and alſo to the ſuperior part of the Trachea arteria, called the Larynx.

The communication between the noſe and throat lays a foundation for a queſtion of conſiderable importance: 'Tis aſked, whether it would be dangerous to exhibit thro' the noſe broths, potions, or other fluids? It ſometimes happens that the *Amygdalæ* become ſo large, as to block up the paſſage of the mouth to the throat. The tongue becomes ſo large, as entirely to fill the cavity of the mouth. There are convulſions of the muſcles of the inferior jaw, in which the teeth are ſo ſtrongly brought together, that nothing can be made to enter the mouth, *&c.* In all theſe caſes the paſſage from the noſe would be of great uſe, if we could without danger convey liquid aliments, *&c.* thro' it to the throat, becauſe from the throat they might deſcend into the ſtomach. By this means we might ſupport the

the patient, till we can render the paſſage thro' the mouth free.

Mr. *Littre* * has made many experiments both on men and brute animals, as well dead as alive, which afford us ſome light with reſpect to this ſubject. According to the natural diſpoſition of the parts now mentioned, the liquor may thro' this way paſs into the duct of the *Œſophagus*. But a portion of this ſame liquor may alſo fall into the *Glottis*, which is always open, except when we ſwallow; for it is not far diſtant from the partition of the palate, whence this liquor deſcends from the noſe into the throat, and is alſo placed in the middle of the entry of the throat, and even ſituated lower and more backwards than the partition of the palate. Experience ſhews, that a portion of the liquor poured thro' the noſe into the throat, ſometimes falls into the *Glottis*, as is evident from the cough which ſucceeds, and which can only be aſcribed to the irritation which this liquor cauſes in the internal membrane of the larynx, which is known to be of a very exquiſite ſenſation, and the true ſeat of the cough. Do we not every day experience, that if in eating or drinking the ſmalleſt quantity of aliments or drink, tho' ever ſo inſipid, falls into the Glottis, we cough with great efforts, and that this cough laſts till this quantity of aliments or liquor is diſcharged? Now is it not to be dreaded that ſuch efforts, eſpecially in patients already weakened and exhauſted by their diſeaſe, or when they have their breaſt much ſtuffed, ſhould fatigue them extremely, induce terrible ſymptoms, and even prove mortal, which Mr. *Littre* ſays he has ſeen happen twice, and that by means of coughing and making efforts to ſpit?

* A phyſician of the faculty of *Paris*. See the memoirs of the royal academy of ſciences, 1718.

But however dangerous it is to exhibit broth, or any other liquor by the noſe, it muſt nevertheleſs be granted, that except in the two caſes I have mentioned, namely, the exhauſtion or weakneſs of the patient, which is the conſequence of his diſeaſe, or when the lungs are much ſtuffed, we may try this method when the paſſage of the mouth to the throat is blocked up, or even when it is free, if the patients are either ſtupid, or ſo obſtinate as to take nothing by the mouth; for beſides that it is the means of nouriſhing the body, and perhaps of curing its ailments, experience has often convinced us that this method has been try'd without the ſmalleſt inconveniences, and the patients greatly relieved, by obſerving the following precautions.

1*ſt*, The head of the patient ought not to be much reclined backwards, becauſe the Œſophagus being then compreſſed, the broth, *&c.* would not have the liberty of paſſing thro' this duct, but might enter into the Glottis.

2*d*, The head and reſt of the patient's body is to be kept ſteady during the operation, otherwiſe the broth or other liquor happening to be ſcattered in the throat on account of the motion, a part of it may fall into the Glottis.

3*d*, We are to pour the broth or other liquor gently into the noſe, that they deſcending gently into the throat may flow along the uvula, or at leaſt be not far from it, or reach not the Glottis; for if theſe liquors ſhould fall into it, they might either ſuffocate the patient or greatly fatigue him, as I have before obſerved.

4*th*, We muſt pour theſe liquors in ſmall quantities at a time, and even ſtop now and then, eſpecially if the patient coughs, for fear the places at firſt deſtin'd to receive theſe liquors, and which is very ſmall, ſhould be choaked up, and they fall into the Glottis.

Laſtly,

Laſtly, 'tis to be obſerved, that the broth, *&c.* ought to be neither too hot nor cold, nor ſalt nor acrid, *&c.* ſince by theſe qualities they would too much irritate the internal membrane of the Larynx, and conſequently excite the moſt violent and terrible coughs.

ARTICLE II.

Of the Oeſophagus.

THE duct which from the bottom of the mouth extends to the anus, may be diſtinguiſhed into three parts. The Œſophagus is the portion between the bottom of the mouth and the diaphragm; the ſecond, which is a kind of ſack, is called the ſtomach; and the third, which reaches from the ſtomach to the anus, comprehends all the inteſtines commonly called bowels.

The ſuperior part of the oeſophagus is dilated almoſt like the mouth of a funnel, and this dilated portion is called the Pharynx.

The *Oeſophagus* deſcends along the neck, being placed behind the Trachea Arteria, running however a little to the left in proportion as it approaches the breaſt where it enters, and continuing along the vertebræ of the back, it croſſes the fleſhy portion of the diaphragm which correſponds to it, and at laſt terminates in the ſtomach.

The *Oeſophagus* is compoſed of ſeveral coats or membranes, and of veſſels both ſanguiferous, nervous and lymphatic. We alſo find ſome ſmall glandular ſubſtances in it.

The firſt or outermoſt coat is common to it with the adjacent parts, and ſeems to be a continuation of the membrane which lines the cavity of the breaſt, and is called the Pleura. The ſecond is fleſhy, and compoſed of two plans of fibres, the outermoſt of which is longitudinal, and the internal circular.

This ſecond coat is ſucceeded by a third called the nervous coat, which appears to be formed of ſeveral tendinous filaments which croſs each other in various directions. Laſtly, the fourth coat, commonly call'd papillous, is very ſoft, porous, and always cover'd with a viſcid lymph, furniſhed by the glandular granulations lodged behind it. In conjunction with the nervous coat it forms ſeveral foldings, which run longitudinally along this duct.

The *Oeſophagus* receives its arteries from the Carotids, from the Aorta inferior, and from the intercoſtal arteries. Its veins diſcharge themſelves into the jugulars, the azygos, and in the coronaria ſtomachica. Its nerves come from the eighth pair.

Subjects have been ſeen in whom the Œſophagus was divided into two equal portions from the firſt to the ſixth true rib, where theſe two portions reunite to form but one duct, which terminated in the ſtomach *. There have alſo been ſubjects in which the Œſophagus has been found dilated above the Diaphragm, where it formed a bag, which loſt itſelf by a very narrow duct in the ſtomach, which was in its natural ſtate.

ARTICLE III.

Of the Stomach.

THE ſtomach is a membranous ſack, ſituated immediately below the Diaphragm in the Epigaſtric region, between the liver and the ſpleen, poſſeſſing the greateſt part of the left hypocondrium.

We ought not to be ſurprized if the ſtomach, when conſiderably augmented in bulk, deſcends lower than the epigaſtric region, and even reaches

* See *Blaſij* Obſ. Med. rarior.

below

below the navel, as I have before obſerved. But it appears ſurprizing, that even in ſmall wounds of the diaphragm, the whole ſtomach ſhould ſlip into the breaſt; this however has ſometimes happened. *Ambroſe Paré*[1] ſays, that in the breaſt he found the ſtomach, which had paſſed thro' a wound in the nervous center of the diaphragm, which was not much longer than an inch. *Fabricius Hildanus*[2] relates a ſimilar obſervation; and what is ſtill more ſurprizing is, to find the ſtomach in the breaſt, without any mark of a wound in the diaphragm. *Riverius*[3] ſays, that in the right part of the breaſt he found the ſtomach poſſeſſing the place of the lobe of the lungs, which was wanting in that ſide, and the perſon never felt the effects of this preternatural ſituation of theſe organs, having for a long time enjoyed a perfect ſtate of health. *Thomas Bartholin*[4] alſo ſays, that in the breaſt he found the ſtomach covered with the Epiploon. There is great reaſon to believe, that theſe two laſt extraordinary caſes depended on a fault of the firſt conformation. I ſhall here add a third extraordinary caſe, which alſo appeared to depend on a fault of the firſt conformation. Mr. *Mouton* the younger[5] opening a fœtus of nine months, was ſurprized on opening the lower belly not to find the ſtomach nor ſpleen, which determined him to open the breaſt, where he found the ſtomach and ſpleen on the left ſide, poſſeſſing the place of the lobe of the lungs, which was wanting on that ſide, and of which there was no mark. Having examined the diaphragm, he found an extraordinary aperture in it, about an inch and

[1] *Ambroſe Paré*, Lib. 10. of wounds in particular.
[2] *Fabricius Hildanus* Obſ. Centur. 4. Obſ. 33.
[3] *Riverius* Obſ. Centur 4. Obſ. 67.
[4] See *Thom. Bartholin* Hiſt. Anat. Centur. 6. Hiſt. 55.
[5] Surgeon of *Paris*, and preſident of his company.

an half in extent, and ſituated at the ſide of that which affords a paſſage to the œſophagus. He alſo found that one lobe of the liver which was almoſt ſeparated from the reſt, had paſſed thro' this aperture. Mr. *Courtois*[1], who was preſent at this diſſection, told me that he ſaw this particular phænomenon with all its circumſtances[2].

In the ſtomach we are to conſider its figure, bulk, veſſels and ſubſtance. Its figure nearly reſembles that of a bag-pipe, having a bottom and two orifices: but this figure is ſometimes altered, for the ſtomach has been found divided into two portions, forming as it were two bags, united by a very narrow duct, by which theſe two portions communicated with each other*.

Its bottom is all that cavity which is found betwixt its two orifices. It forms as it were two ends of a bag, of which the moſt conſiderable lies to the left, and the other to the right ſide. Of the orifices, one is towards the left, and called *Cardia*, and the other towards the right, called the *Pylorus*. The firſt correſponds to the *Œſophagus*, and the ſecond, which is much ſmaller, correſponds to the inteſtines, and affords a paſſage for the aliments or other ſubſtances which are in the ſtomach. The cavity of the ſtomach is not always equally large, and it is generally leſs in women than in men. 'Tis ſufficiently obvious, that the ſtomach being membranous may eaſily yield; thus, tho' generally this ſack contains but five pints of liquor, yet there have been ſtomachs found capable of containing nine pints. This organ is very ſmall in perſons who have continued long without eating. Mr. *Ruyſch* ſays, he found the ſtomach little wider than the inteſtines, in

[1] Surgeon of *Paris*, and preſident of his company.
[2] See memoirs of the royal academy of ſciences. 1729.
* See *Blaſii* Obſ. Med. rarior.

a man

a man who died after a long abſtinence from aliments.

In the ſtomach we are alſo to conſider two ſurfaces, commonly diſtinguiſhed into anterior and poſterior, and two curvatures, namely, a great one, which runs along the whole bottom of the ſtomach, from one of its orifices to another, and a ſmall one, which alſo paſſes from one orifice to the other, but which is oppoſite to the former.

The ſtomach is ſituated obliquely, and in ſuch a manner that its left orifice is always much higher than its right. We alſo obſerve, eſpecially when the ſtomach is full, that its great curvature is placed before and its ſmall one behind; and that its ſurfaces, commonly called anterior and poſterior, are at that time ſuperior and inferior, which occaſions a folding or flexure in the Œſophagus, where it is joined with the ſtomach.

The ſubſtance of the ſtomach, like that of the Œſophagus, is compoſed of ſeveral membranes or coats: the outermoſt appears to be not only a continuation of the Peritonæum, but alſo of the greater and ſmaller Epiploon: the ſecond is muſcular, and compoſed of ſeveral plans, which may be diſtinguiſhed into three; the outermoſt has its fibres longitudinal, and running from one orifice to the other; the fibres of the ſecond plan are ſtronger than thoſe of this, and are called circular, becauſe they embrace the whole circumference of the ſtomach; but when they are carefully examined, they appear to be ſegments of circles uniting here and there, rather than compleat circles. On the great prominence of this organ they form a kind of vortex, whoſe centre is upon the middle of that prominence. The third plan, whoſe fibres are oblique, is ſituated between the two former, and forms near the ſuperior orifice of the ſtomach two particular Congeries, in form of bands, which ſurround that orifice, croſſing

croſſing each other both in the anterior and poſterior part*.

The third coat of the ſtomach is called *Nervous*, and compoſed of a pretty compact texture of ſeveral very fine filaments, which croſs each other obliquely; theſe filaments appear as it were tendinous. This membrane by its convexity ſuſtains a great number of ramifications of veſſels, both ſanguiferous and nervous. Some authors make a particular membrane of this aſſemblage of veſſels, and call it the *Membrana vaſculoſa*. The nervous coat is more extenſive than the other two membranes. 'Tis alſo obſervable, that in conjunction with the laſt coat called *Villous*, it forms ſeveral foldings, which generally run according to the length of the ſtomach.

The fourth coat of the ſtomach is called *Villoſa* or *Villous*, becauſe when viewed in water it has ſome reſemblance to velvet. It is alſo called Tunica Fungoſa, and is compoſed of ſeveral filaments, like a very fine cotton. In it we diſcover a great many ſmall holes, which correſpond to as many ſmall glands concealed behind, which furniſh the *Stomachic Lymph* or *Gaſtric Juice*. Theſe glands are more eaſily diſcovered in the ſtomach of a hog than in that of a man, in which however we diſcover them tho' more eaſily in ſome ſubjects than in others. Theſe two membranes alſo form near the *Pylorus* a particular folding which is called the valve of the *Pylorus*, and whoſe figure is nearly circular. In its middle there is an aperture for the diſcharge of the aliments, or other ſubſtances contained in the ſtomach.

Nothing elſe is remarkable in the ſtomach except its veſſels, which are of three kinds, ſanguiferous,

* See *Helvetius*'s memoirs of the royal academy of ſciences, 1718.

nervous,

nervous, and lymphatic. As for the ſanguiferous, the arteries are furniſhed to this organ from the cœliac trunk, and it alſo ſometimes receives ſome from the ſuperior Meſenteric. Its veins diſcharge their contents into the *Vena Portæ*. All theſe veſſels have particular names, which they derive either from the part of the ſtomach to which they are diſtributed, or from their ſhortneſs, as thoſe called the *Vaſa Brevia*.

Its nerves are furniſhed by the eighth pair, and are diſtributed in a greater number to its ſuperior orifice than in the reſt of its extent. Hence it is, that the ſlighteſt impreſſions made on that part are very painful. The lymphatic veins diſcharge their contents into the *Receptaculum Chili*.

ARTICLE IV.

Of the Inteſtines.

THE duct which reaches from the ſtomach to the Anus, comprehends the whole inteſtines, commonly called the bowels. From their different diameters they are divided into ſmall and large; the ſmall are three in number, namely, the *Duodenum*, the *Jejunum*, and the *Ileum*: the large are alſo three in number, namely, the *Cæcum*, the *Colon*, and the *Rectum*.

All the inteſtines, except the *Duodenum*, adhere to a membranous body called the Meſentery, which is diſtinguiſhed into two portions; the *Meſaræum* is that portion of the Meſentery which fixes the ſmall inteſtines, and the *Meſocolon* that which fixes the large.

The Meſentery is compoſed of two laminæ, between which are found a cellular texture, a great number of veſſels, and laſtly, many conglobate glands.

The

The veſſels diſtributed to the Meſentery, and by its means to the inteſtines, are arteries, and veins both ſanguiferous, lymphatic and lacteal, and laſtly, nervous: theſe veſſels run between the two membranes of which the Meſentery is compoſed. The arteries come from the inferior Aorta, and are called *Meſenteric*, as well as the veins which diſcharge their contents into the *Vena Portæ*. The nerves are furniſhed to it by the eighth pair, and by the Intercoſtal. I ſhall afterwards treat of the lymphatic veins and lacteals, as well as of the conglobate glands.

The Meſentery is formed by a particular folding of the Peritonæum. Its portion, called the *Meſuræum*, is fixed to the ſuperior vertebræ of the loins. It deſcends obliquely, approaching to the ſmall inteſtines, in which it terminates, and in ſuch a manner, that the two Laminæ which compoſe it ſeparate in order to embrace theſe inteſtines. This portion of the Meſentery forms ſeveral foldings in its circumference, and by this means it contains a more conſiderable length of the inteſtines in a ſmall ſpace.

The portion of the Meſentery, called the *Meſocolon*, appears to be only an elongation of the former. The *Meſocolon* begins about the end of the Ileum, whence running from the right to the left, it reaches the Colon, to which it adheres in all its extent, and thence continuing to the *Pelvis*, it alſo adheres to the Rectum. Some call this laſt portion the *Meſorectum*.

The inteſtines are compoſed of ſeveral coats or membranes, of veſſels, both ſanguiferous, nervous, and lymphatic; we alſo diſcover a great number of conglomerate glands in it.

There are ſeveral coats in the inteſtines arranged in the ſame manner with thoſe in the ſtomach, namely, one membranous, one carnous, one nervous,

and

and one villous; to which ſome anatomiſts add two others, which they call cellular and vaſcular. The arrangement of all theſe coats is ſuch, that the membranous is the firſt or outermoſt, the cellular the ſecond, the fleſhy the third, the vaſcular the fourth, the nervous the fifth, and the villous the ſixth.

The firſt or outermoſt coat of the inteſtines is an expanſion of the Meſentery; it is therefore obvious, that the Meſentery terminates in all its circumference by a membranous canal which lodges the inteſtinal Duct. Under this coat we find a cellular texture, ſometimes loaded with a great deal of fat in certain ſubjects.

The ſecond coat is fleſhy, and compoſed of two plans of fibres; the outermoſt are longitudinal, and the innermoſt circular. Theſe laſt are more remarkable than the firſt. Under the fleſhy coat we obſerve a ſurprizing piece of net-work, formed by the ramifications of a great number of veſſels, both of the ſanguiferous, nervous, and lymphatic kinds. Of this piece of net-work ſome have made a particular membrane, which they call *Vaſcular*.

The third coat, called *Nervous*, is compoſed as well as that of the ſtomach of ſeveral white filaments, which appear tendinous, and which croſs each other obliquely.

The fourth is called Villous on account of its ſuppoſed reſemblance to velvet. *Helvetius*, by means of maceration, has diſcovered in this membrane a great number of ſpongious Papillæ, moſt of which are flat. Theſe two membranes are longer than the former, and alſo form in the cavity of the inteſtines, and principally in that of the *Duodenum* and *Jejunum*, ſeveral foldings, whoſe figure reſembles that of a creſcent. Theſe different foldings are called the *Valvæ Conniventes*.

The

The firſt of the ſmall inteſtines is called *Duodenum* from its length, which is about twelve fingers. This inteſtine begins at the Pylorus, and terminates on the body of the ſecond vertebræ of the loins, where the *Jejunum* begins. The Duodenum in its courſe forms three different circumvolutions. In its cavity we obſerve the orifices of a great number of ſmall glands, commonly called the Glands of *Brunnerus**. We alſo diſcover in it, about four fingers breadth from the *Pylorus*, the mouths of the cholidoik and pancreatic Ducts, which is generally common to them both. This inteſtine has a particular artery and vein, called *Duodenal*; the artery comes from the Cœliac, and the vein diſcharges its contents into the trunk of the *Vena Portæ*. The *Duodenum* is not like the other inteſtines, adherent to the *Meſæum*, but is included in a triangular ſpace, which the Meſocolon forms in that part.

The ſecond of the ſmall inteſtines is called the *Jejunum*, becauſe it is moſt frequently found empty. It poſſeſſes the middle and umbilical region. In its interior part we obſerve many *Valvulæ Conniventes*, and in different parts parcels of glands called the Glands of *Peyerus*. This inteſtine has a greater number of ſanguiferous veſſels than the reſt, for which reaſon its colour is reder.

The third of the ſmall inteſtines is called the *Ileum*. This poſſeſſes the Iliac region, and even a part of the Pelvis. In the beginning of this inteſtine are a great many *Valvulæ Conniventes*, which afterwards become more frequent: near its end none of them are to be found, but only ſome longitudinal folds or wrinkles. In the cavity of this inteſtine, and eſpecially in its end, we find ſeveral parcels of the glands of *Peyerus*. This is the longeſt of all the ſmall inteſtines.

* Tractat. de Glandulus Duodeni.

Anatomiſts

Anatomiſts differ with reſpect to the part where we ought to fix its beginning. Some only regarding the colour of the *Jejunum*, which is reder than that of the *Ileum*, take the portion of the duct which is leaſt red for the beginning of the *Ileum*. Others only regarding the ſituation of theſe inteſtines, give the name of *Jejunum* to that portion of the duct which is ſituated principally in the umbilical region, and call the remaining portion, which principally poſſeſſes the iliac regions, the *Ileum*.

The *Ileum* runs a little obliquely from the left to the right, in order to terminate in the firſt of the large bowels called the *Cæcum*.

The *Cæcum* is a round bag in form of the end of a ſack, obſervable at the end of the *Ileum* and beginning of the *Colon*. The length and breadth are nearly three or four fingers. This bag is ſituated on the right ſide, immediately above the *Os Ileum*, and adheres to the middle of the *Peritonæum*, at the inferior part of the kidney on the ſame ſide.

The *Ileum* opens into the ſuperior part of the *Cæcum*, preciſely where the *Colon* begins. At the mouth of the *Ileum* we find two foldings formed by the *Cæcum*, the *Colon*, and by the *Ileum*, which inſinuates itſelf between the two, where it is retained, not only by its external membrane, but alſo by the firſt plan of its fleſhy coat. Theſe two foldings compoſe what we commonly call the valve of the *Colon*, which hinders the ſubſtances contained in the large, from coming into the ſmall inteſtines.

In the *Cæcum*, beſides the valve I have now mentioned, we find the orifice of a membranous duct, which can hardly receive the point of a ſmall quill into its cavity. This duct, which is about five or ſix fingers breadth in length, ought to be looked upon as a continuation of the *Cæcum* itſelf. It is

commonly called the vermiform appendix of the Cœcum, and adheres, according to its length, to a membrane which ſerves it as a Meſentery. The internal membrane of this appendix is pierced with a vaſt number of ſmall holes, which correſpond to ſo many ſmall glands.

Mention is made in a collection of obſervations *, of a ſupernumerary *Inteſtinum Cæcum*, tho' nothing is ſaid of its particular ſtructure, but only that it adhered to the *Jejunum*. It is probable that this *Cæcum* was only a kind of appendix or ſort of long bag, ſuch as we ſometimes tho' rarely find detached from the *Ileum* or Jejunum. Their compoſition appears the ſame as that of the inteſtine with which theſe appendices are generally joined. They may from their figure be called digital appendices, becauſe they have ſome reſemblance to the finger, and have a kind of valve at their beginning.

The *Colon* is the ſecond of the large inteſtines, begins at the Cœcum oppoſite to the right kidney, and adheres to the membranes which cover it; it afterwards aſcends under the liver, touches the bladder which communicates to it the colour of the bile which it contains, continues its courſe along the inferior part of the ſtomach, and advances as far as the ſpleen, to which it alſo adheres by means of the *Epiploon*. The portion of the Colon which paſſes tranſverſly into the epigaſtric region, is called the Arch of the Colon, and to this portion of the Colon the Epiploon principally adheres. The Colon afterwards deſcends upon the left kidney, joining the membranes which cover it, and reaches the inferior part of the Os Ileum, whence it aſcends running a little to the right, and forms in its courſe two circumflexions pretty like thoſe of a roman S, and at

* See Miſcell. Medico-Phyſica. Acad. Nat. Curioſ. *German*, *Paris*, 1672, Obſ. 24.

laſt it terminates in the *Rectum*. The portion of this inteſtine, which reaches between the left kidney and the Rectum, is for the moſt part narrower than the reſt of its extent.

In the ſurface of this inteſtine we diſcover pingous appendices, which are more or leſs conſiderable according to the corpulence of the ſubject. There are alſo three ligamentary bands, which run along its length, as well as over the *Cæcum*. Theſe bands ſeem to derive their origins from the appendix of the *Cæcum*, where they reunite. They are fleſhy, and ſerve as longitudinal fibres to the Cœcum and the Colon. They adhere to theſe two inteſtines in ſuch a manner, that they ſeem to gather or collect them, that is to ſay, they here and there form them into ſeveral foldings, which incline to the internal part of theſe inteſtines, and there form as many ſpecies of Valves in form of a creſcent, which only extend from one band to the other. In the interior part of theſe inteſtines we diſcover glands, which are of the ſame nature with thoſe of the ſmall inteſtines, from which they only differ in this, that they are not found in parcels, but lie one by one, for which reaſon they are called *ſingle*.

The laſt of the great inteſtines called the *Rectum*, begins at the end of the *Colon*, oppoſite to the laſt vertebra of the loins, deſcends along the *Os Sacrum* and *Coccyx*, and even advances about an inch farther without making any circumvolution. The membranes of this inteſtine are thicker than thoſe of any other. We obſerve no valves, but only ſome wrinkles in them. On the end of this inteſtine we diſcover ſeveral apertures or *Lacunæ*, which correſpond to as many glands, which furniſh a liquor proper to mitigate the gripes and ſhudderings which may be produced by the indurated excrements. We here alſo obſerve ſeveral ſmall ſemi-lunar foldings.

The breadth of the *Rectum* is about three fingers, though it is ſometimes found more, but this depends on the long retention of the excrements in its cavity. The connexions of this inteſtine are with the *Os Sacrum* and *Coccyx*; and beſides this, in man, with the bladder, the proſtate gland, and the Veſiculæ Seminales; and in women, with the paſſage called the *Vagina*. This inteſtine is ſurrounded with a great deal of fat, eſpecially at its extremity, which forms the Anus, in which we are to conſider three particular muſcles: the firſt and moſt conſiderable is called the *Sphincter Ani*. This muſcle embraces the extremity of the *Rectum* for about three fingers breadth, and even advances a large inch beyond the end of that inteſtine, to adhere to the ſkin which ſurrounds the *Anus*. This muſcle in acting exactly cloſes the extremity of the *Rectum*, and prevents the continual diſcharge of the Fæces. It has its fixed adheſions at the internal part of the *Coccyx*, and afterwards divides itſelf into two portions which embrace the extremity of the *Rectum*, and in man communicate with the Accelerator muſcles of the neck of the bladder, and in women with thoſe which embrace the beginning of the Vagina. The fibres of this muſcle are confounded with the circular fibres of the fleſhy membrane of the *Rectum*.

Several anatomiſts make two muſcles of the two portions of the *Sphincter Ani*, giving the name of *external* or *cutaneous Sphincter* to the part which adheres to the ſkin round the Anus, and that of *internal* or *inteſtinal Sphincter* to the portion which embraces the extremity of the *Rectum*. The figure of the firſt is oval, adhering by its ſuperior part to the extremity of the *Coccyx*, by means of an appendix partly fleſhy and partly tendinous; and at its inferior part, alſo by means of a ſimilar appendix, to the ſkin of the Perinæum.

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The two other muſcles of the Anus are called *Elevatores*. They have their fixed adheſions on each ſide by a pretty broad origin, not only at the ſuperior and internal part of the Os Pubis, but alſo at the internal part of the *Ileum*, a little above where it is joined with the *Iſchium*, and laſtly, at the ſpine of the Iſchium. The fibres of this muſcle converge, like lines drawn from the circumference to the centre of a circle, running to the poſterior part of the Rectum which they embrace, confounding themſelves with thoſe of its ſphincter. The fibres of the Elevator muſcles alſo embrace in men the neck of the bladder, the ſuperior proſtate glands, and the Veſiculæ Seminales, and in women the Vagina.

The principal uſe of the Elevator muſcles, is to ſuſtain the fundament or extremity of the Rectum in going to ſtool.

ARTICLE V.

Of the ſeveral Paſſages of the Chyle.

IF we open a living or recently killed dog, two or three hours after he has eaten pretty heartily, we find on the ſurface of the inteſtines, and principally of the ſmall ones, a great number of ſmall white veſſels called Lacteal veins, which inſinuate themſelves between the two membranes of the Meſentery, communicate with each other, and advance towards a glandulous body placed in its middle, and called the Pancreas of *Aſellius*, from the name of him who diſcovered the lacteal veins in the year 1622. To this glandulous body the lacteal veins come, and from its ſubſtance we ſee other lacteal veins riſing, which only differ from the former in this, that they appear to be fewer in number, but ſomewhat larger. Theſe are called ſecondary, to diſtinguiſh them from the former, which run from the inteſtines into the Pancreas of *Aſellius*.

The ſecondary lacteal veins diſcharge their contents into a membranous and cellular bag, which is generally placed on the body of the firſt vertebra of the loins, and partly concealed by the right appendix of the Chyle. This bag is called the *Receptaculum Chili*, or the *Receptacle of Pecquet*, a celebrated *French* anatomiſt, who diſcovered it in the year 1651.

From the ſuperior part of this receptacle there ariſes a white veſſel, and ſometimes two, which for the moſt part reunite about three fingers breadth from their origin, in order to form what we call the Thoracic duct, which advances anteriorly along the vertebræ of the back; it is placed between the inferior Aorta and the *Azygos*, and having arrived about the fifth vertebra of the back, this duct, which before advanced along the middle of the bodies of theſe vertebræ, turns a little to the left to diſcharge its contents into a large vein, called from its ſituation the left *Subclavian*.

The lacteal veſſels, the receptacle of the Chyle, and the thoracic duct, are diſcovered in a man as well as in a dog, but for this purpoſe 'tis requiſite that he has taken aliments three or four hours before his death. It is by ſome thought abſolutely neceſſary to ſee theſe veſſels, that we ſhould open the ſubject immediately after his death; however, I have ſeen and demonſtrated them in a man three days after his death.

The lacteal veins are not only diſcovered on the ſmall, but alſo on the large inteſtines, ſuch as the *Cæcum* and the *Colon*; and it is by this means that we explain how it is poſſible for ſeveral days, and even ſometimes for a month, to nouriſh patients purely by the help of nutritive clyſters.

In men we obſerve, that the glands of the Meſentery are interſperſed through all its extent, inſtead

inſtead of being collected into one body like thoſe of a dog.

'Tis alſo obſervable, that in ſome ſubjects the thoracic duct makes ſeveral circumvolutions round itſelf, which greatly augments its length.

The lacteal veſſels and the thoracic duct have internally ſeveral valves, diſpoſed in ſuch a manner as to prevent the return of the Chyle, which goes from the inteſtines to its receptacle, thence to the thoracic duct, and from that to the left ſubclavian vein. At the opening of the thoracic duct into the ſubclavian vein there is a valve, which in a dog is of the form of a creſcent, whoſe convex part is turned towards the armpit, and its concave part towards the oppoſite ſide. From the diſpoſition of this valve we perceive, that it permits the Chyle to enter into the ſubclavian vein, and prevents its courſe from being interrupted by the paſſage of the blood into this vein.

The figure of this valve is not ſo eaſily determined in man on account of its ſmall extent, the orifice of the thoracic duct being very ſmall. *Adolphus Vedelius* pretends, that there are two valves placed oppoſite to each other. Mr. *Duverney*, member of the academy of *Peterſburg*, aſſures us, that there is but one, of a different figure from the other valves, being however nearly circular. In ſome ſubjects the thoracic duct and the *Receptaculum Chili* have been found double, that is, poſſeſſing each ſide.

In man we obſerve that the thoracic duct paſſes behind the left ſubclavian vein, forming a kind of arch, and running afterwards from behind forwards, and ſomewhat from above downwards, it diſcharges its contents into that vein, immediately at the external ſide of the internal Jugular.

The Lacteal veins, both primary and ſecondary, are as many lymphatic veſſels, that is to ſay, they

always receive the Lymph which returns from the inteſtines and the Meſentery; and after digeſtion they alſo receive the Chyle, which mixing with the lymph which it finds in theſe veſſels, becomes more fluid, and conſequently more proper to flow into the *Receptaculum Chili*.

This receptacle not only receives the Lymph and Chyle which come from the lacteal veins, but alſo the whole Lymph, carried thro' the lymphatic veins of the inferior extremities, and thoſe of the abdominal viſcera, and this receptacle afterwards diſcharges its contents into the thoracic duct.

Of the Digeſtion of the Aliments.

The continual loſſes which our bodies ſuſtain, as well by inſenſible tranſpiration as by other evacuations, render it neceſſary for us to find aliments in order to repair them. We ſhall therefore examine the preparations which theſe aliments undergo to produce this reparation, and which may be reduced to three; the firſt is made in the mouth, the ſecond in the ſtomach, and the third in the firſt of the ſmall inteſtines.

The aliments are divided in the mouth during maſtication, as well by the action of the teeth, as by their mixture with the Saliva. They afterwards paſs into the Pharynx, into which the tongue, by raiſing itſelf and carrying itſelf backwards, forces them to enter. By this motion the Epiglottis is depreſſed, and the Glottis cloſed.

The partition or arch of the palate by raiſing itſelf, hinders the aliments from entering into the Naſal Foſſæ, and the *Uvula* makes thoſe paſs by its ſides which go directly to the *Glottis*.

The aliments which have been conveyed into the Pharynx are obliged to follow the road of the Œſophagus, whence they deſcend into the ſtomach, much leſs by their proper weight than by the ſucceſ-

ſive

five compreſſions which they receive, as well from the œſophagian muſcle which is at the beginning of this duct, as from the circular fibres of its fleſhy coat.

The aliments having continued ſome time in the ſtomach, are there reduced into a ſoft paſte of a greyiſh colour, and generally of a tartiſh taſte and ſmell.

The moſt generally received opinion concerning the cauſe of this change, is that which ſuppoſes it to depend not only on the Saliva which continually flows thro' the Œſophagus, but alſo on the gaſtric liquor furniſhed by the glands of the ſtomach. Experience proves, that theſe liquors are not ſimply aqueous, but impregnated with active and penetrating parts, whoſe action is not confined to the Molecules or integral parts of the aliments, but extends farther, and reaches the eſſential or conſtituent principles which compoſe them, and of which it changes the natural arrangement. The aliments by being thus decompounded, change their natures, and are not after digeſtion what they were before. 'Tis alſo thought that the action of theſe liquors muſt be ſeconded by the gentle contraction of the fleſhy fibres of the ſtomach, and the ſucceſſive action of the diaphragm and abdominal muſcles.

In proportion as the diviſion of the aliments is augmented in the ſtomach, that which is moſt attenuated eſcapes thro' the Pylorus into the *Duodenum*. The paſſage of the aliments thro' the *Pylorus* is favoured by the oblique ſituation of the ſtomach, and the gentle contraction of its fleſhy coat.

This ſoft and greyiſh paſte into which the aliments are changed in the ſtomach, coming into the *Duodenum* is there mixed with the Bile, as well as with the inteſtinal and pancreatic juices; and by this mixture it acquires a new degree of perfection, becomes white, mild, and liquid, and being preſſed by the

vermicular motion of the inteſtines, and paſſing ſlowly into their cavity on account of the valves found there, it ſends into the lacteal veins the moſt ſubtile and pure part of what they contain, namely, the Chyle, which is deſigned to repair what we loſe by the ſeveral evacuations.

'Tis obvious that the matter of nouriſhment, or this alimentary paſte, having paſſed thro' the whole extent of the ſmall inteſtines, and being in its courſe deprived of its moſt fluid and pure part, muſt of courſe become thicker in proportion as it paſſes into the large inteſtines. After this it is no more than the dregs of the aliments, which permit the little Chyle remaining in them to eſcape into the lacteal veins which correſpond to the *Cæcum* and the Colon. The Valve, which is at the beginning of the Colon, hinders this groſs matter from re-entering the ſmall inteſtines, and the length, curvature, and cellules of this inteſtine permit it to contain a great quantity of it, that we may not be obliged to go too often to ſtool. As for the lymph furniſhed by the ſingle glands of the large inteſtines, it facilitates the paſſage of this groſs matter thro' their cavities; and the Sphincter which cloſes the extremity of the *Rectum*, hinders it from being continually evacuated. In a word, it is not evacuated except when this ſpring is as it were forced open, not only by the weight of the excrements, but alſo by the contraction of the fleſhy coat of the *Rectum*, joined with that of the muſcles of the lower belly and Diaphragm.

The Chyle which, as I have ſaid, is furniſhed by the alimentary matter in the lacteal veins, inſinuates itſelf into the orifices of thoſe veſſels which according to *Helvetius* correſpond with the ſpongeous Papillæ of the papillous coat, or with the floating edges of the Valvulæ Conniventes, according to the obſervations of Mr. *Duverney*, and continuing its road in theſe veſſels, it enters the conglobate glands diſperſed

perſed in all the extent of the Meſentery; and having paſſed thro' theſe glands it alſo runs thro' the ſecondary lacteal veins, to diſcharge itſelf into the *Receptacle* of *Pecquet* and thoracic duct, and thence to go into the ſubclavian vein, where being mixed with the blood contained in it, and circulating along with this blood, it gradually acquires its character and properties, and is at laſt converted into true blood. This blood, after ſeveral reiterated circulations, muſt alſo change its nature, and form the different liquors which are ſeparated from it, I mean the nutritive Lymph, the Bile, the Saliva, *&c.*

We will eaſily conceive the cauſe which makes the Chyle advance from the inteſtines to the ſubclavian vein, if we conſider, 1*ſt*, That all the veſſels thro' which it paſſes in this road are here and there fortified with Valves or ſuckers, whoſe ſtructure favours the paſſage of this liquor into that vein. 2*d*, That theſe veſſels are beſet by organs which make gentle but reiterated compreſſions on their ſides; ſuch are the meſenteric arteries with reſpect to the lacteal veins; and the Aorta, with reſpect to the thoracic duct and receptacle of the Chyle, to which we ought to add the Diaphragm, which at each inſpiration compreſſes the receptacle, without counting the action of the muſcles of the lower belly, whoſe contractions ſucceed thoſe of the Diaphragm, if we except the time in which they make efforts, as I have before obſerved. It is alſo to be obſerved, that the lacteal veſſels are never empty, the Lymph paſſing continually into them, whether with or without the Chyle.

Before we examine the ſtructure of the Viſcera, where the ſecretions of the different Humours which concur to the ſupport of the animal œconomy are performed, I think it proper to ſay ſomething of ſecretions in general.

CHAP.

CHAP. IV.

Of Secretions in general.

THE blood is not entirely compoſed of its red, its lymphatic, and its ſerous part, ſince there are ſeveral other liquors mixed with it. Theſe different humours are ſeparated from it by particular organs called glands, and the ſeparation of theſe fluids from the reſt of the blood is called *Secretion.*

The Secretions ſuppoſe two conditions, one on the part of the blood, and another on that of the organ.

Many learned phyſicians think, that all the humours are formally contained in the blood, and according to ſome, they owe their production principally to that motion of the blood which they call the motion of fermentation. That theſe humours may be furniſhed by the blood, it is therefore requiſite that this motion, as well as the others found in it, ſuch as that of *Fluidity* and that of *Truſion*, or the *Progreſſive Motion*, ſhould be well regulated.

As for the organs called glands, anatomiſts have made two ſorts of them, namely, *Conglomerate* and *Conglobate.* Theſe laſt are of no other uſe than to receive and perfect the Lymph, by attenuating its parts. Such are the glands of the armpits and groins, *&c.* There are alſo conglobate glands, which beſides the Lymph brought to them from the lymphatic veins of the adjacent parts, alſo receive the Chyle after the digeſtion of the aliments, in order alſo to perfect it, and ſuch are the glands of the Meſentery.

The conglomerate glands are deſtin'd to ſeparate from the blood thoſe different humours which are mixed with it, as the *Liver* which ſeparates

the *Bile*, the *Parotids* which ſeparate a part of the *Saliva*, and the *Kidneys* which ſeparate the Urine, *&c.*

To conceive in what manner the conglomerate glands are capable of ſeparating theſe different liquors, we are with ſome eminent phyſicians to conſider them as ſo many congeries, formed principally of ſeveral particular veſſels called *Secretory* and *Excretory*, and of a great number of nerves, arteries, and veins, both ſanguiferous and lymphatic. We ought at the ſame time to obſerve, that the ſanguiferous and lymphatic arteries are continuous with the veins of the ſame kind, that is to ſay, that the ſanguiferous veſſels are continuous to the ſanguiferous veins, and the lymphatic arteries to the lymphatic veins. 2*d*, That the ſecretory veſſel takes its origin at the union of the lymphatic artery with the vein of that name: and laſtly, that the lymphatic artery derives its origin from the capillary ſanguiferous arteries. Mr. *Winſlow* * ſays, he has obſerved that the ſecretory veſſel, which conſtitutes the greateſt part of the texture of the gland, is internally furniſhed with a kind of down, fleecy ſubſtance, which is well expreſſed by the Latin word *Tomentum*, and that this down is of different colours, according to the nature of the liquor which is to be ſeparated in the glands. 1*ſt*, If we ſuppoſe with this learned Anatomiſt, that the down of the ſecretory veſſel is from its firſt conformation impregnated with as many different humours as there are glands; 2*d*, if we conſider that a piece of grey paper, which is only a congeries of filaments cloſely united with each other, being once ſoaked in oil or water, only permits a liquor ſimilar to that with which it is impregnated to paſs thro' it; and that a piece of cloth dip'd in oil and immerſed in a mixture of oil and

* See memoirs of the royal academy of ſciences, 1740.

water,

water, only permits the parts of the oil to paſs thro' its texture, without being penetrated by thoſe of the water: I ſay, from theſe circumſtances we may form ſome idea of the manner in which the humours are ſecerned thro' the ſecretory veſſels of the gland. In a word, the general reſemblance which ſubſiſts between the filamentous texture of grey paper or cloth, and that of the down which fills the cavity of the ſecretory veſſel, renders it probable that the ſame mechaniſm takes place in the glands as in the paper and cloth, and that the ſame cauſe which hinders the water from paſſing thro' the paper or cloth dip'd in oil, will alſo hinder all thoſe liquors mixed with the maſs of blood which ſhall arrive at the mouth of the Secretory veſſel from entering into it, except that which is analogous, homogeneous, or like the humour with which the down was from its firſt conformation impregnated.

It is therefore obvious, that the blood impregnated with the different humours which ought to be ſecreted from the glands, being conveyed into theſe organs by the ſanguiferous artery, will in the lymphatic artery, which is continuous to it, furniſh a part of the Lymph which it contains, which being impregnated with different liquors which ought to be ſecreted, will ſuffer to eſcape into the orifice of the ſecretory veſſel, the humour analagous to that with which the down is impregnated, while the other humours which have no relation to it will paſs thro' the lymphatic vein, which will diſcharge them into the maſs of blood, that they may be tranſmitted to the glands which ought to ſecrete them.

The liquor introduced into the ſecretory veſſel continues to flow through its different ramifications till it reaches the excretory veſſel. It ſometimes happens that the ſecretory veſſel correſponds to no excretory duct, in which caſe it depoſits the liquor

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it contains in particular repoſitories in form of Veſicles, as we obſerve in the glands of the ſtomach, inteſtines, *&c.* Some imagine that the ſecretory veſſels ariſe from the curvature which the ſanguiferous artery forms at its union with the ſanguiferous vein. But as Mr. *Helvetius* obſerves, a liquor, in order to be conſtantly filtrated thro' the ſame veſſel appears to ſtand in need of a mild and peaceable motion, which could not happen, if the ſecretory veſſel derived its origin from the ſanguiferous veſſels.

The humours ſecreted by the conglomerate glands are diſtinguiſhed into three claſſes. The humours of the firſt claſs are call'd *recrementitious*. Theſe are the humours, which being once ſeparated from the maſs of blood, enter into it again for different uſes; ſuch are the oleous juice included in the cellules of the marrow, the liquor of the Pericardium, that of the ventricles of the brain, that of the cerebellum, *&c.*

The ſecond claſs contains the humours called *Excrementitious*, that is to ſay, thoſe which being once ſeparated from the maſs of blood are no more mixed with it, or if they are, the animal generally ſuffers ſome alteration; ſuch are the urine, the matter of inſenſible tranſpiration, that of the ſweat, *&c.*

The third claſs includes a kind of humours which are partly *recrementitious* and partly *excrementitious*, that is to ſay, a portion of theſe humours re-enters the maſs of blood, while the other portion is not again mixed with it, but is thrown out of the ways of the circulation; ſuch are the *Saliva*, the *Bile*, the *Gaſtric Inteſtinal*, and *Pancreatic Juices*, &c.

CHAP.

CHAP. V.

Of the Liver.

THE liver is a conglomerate gland, of a very conſiderable ſize, of a browniſh red, and of a pretty firm conſiſtence. It takes up not only the greateſt part of the right Hypocondrium, but alſo the anterior of the middle Epigaſtric region, and extends itſelf even to the left Hypocondrium. This however happens moſt generally in a Fœtus, in whom the ſize of this inteſtine is proportionably larger than in adults.

The liver is uſually extended over the fore part of the ſmall ribs about two fingers breadth, more or leſs, according as the Diaphragm to which it adheres, and whoſe motions it follows, is placed lower towards the Abdomen, or more raiſed towards the breaſt, and as the ſtomach or inteſtines are more or leſs full, and it extends to the loweſt of the falſe ribs.

The liver is commonly divided into two parts called *Lobes*, one of which is the right, and the other the left; this diviſion appears upon its upper or convex ſurface by a membranous ligament, and on its concave or lower ſurface by a deep line commonly called the cleft of the liver. It traverſes all the lower part of this inteſtine, and its beginning correſponds to the anterior extremity of the cartilaginous part of the firſt ſhort rib. This ſciſſure is ſometimes changed into a ductor canal.

The Lobe on the right is larger than that on the left, for which reaſon that on the right is called the great Lobe of the Liver, and that on the left the ſmall. The particular ſituation of theſe Lobes is ſuch, that the great Lobe ſeems to be placed perpendicularly,

pendicularly, and the ſmall one tranſverſely, ſo as to cover a conſiderable part of the ſtomach.

The liver is not of a regular figure, but is accommodated to the ſtructure of the adjoining parts. For this reaſon it is convex and ſmooth on its ſuperior ſurface, that it may the better accommodate itſelf to the ſmooth concavity of the Diaphragm, to which it is fixed, and which it follows in all its motions. Its inferior ſurface is concave and unequal, having ſeveral eminences and cavities, both to ſuit the convexity of the adjoining organs, and to correſpond to the cavities or interſtices betwixt theſe organs.

Theſe eminences are peculiar only to the larger lobe of the liver, and the principal of them is triangular. *Spigelius* was the firſt who has mentioned it by the appellation of the little lobe, wherefore thoſe who account it a diſtinct lobe call it *Spigelius*'s little lobe. On the anterior part is found another eminence, not ſo prominent but of a larger ſurface. The antients have diſtinguiſhed theſe eminences by the name of *Portæ*.

The concave part has ſeveral depreſſions, the firſt of which is the ſciſſure of the liver, which by traverſing its concave part ſeparates its lobes. The ſecond depreſſion is on the fore part of the great lobe, and contains the gall-bladder. On the poſterior part is a ſmall hollow, correſponding to a part of the right kidney. The ſmall lobe has alſo another hollow anſwering to the ſtomach, over which it is extended. On the poſterior edge of the liver there is a large kind of hollow or groove, which is common to both lobes, and affords a paſſage for the *Spina Dorſi* and the extremity of the Œſophagus. There is alſo a little hollow on the hind part, for facilitating the paſſage of the *Vena Cava*. The poſterior part of the liver is in the greateſt part of its extent terminated by a pretty round border or

edge

edge, quite different from that of its anterior part, which is ſlender and pointed.

The liver adheres to the adjoining parts, but eſpecially to the Diaphragm, by means of four ligaments, *viz.* the *Suſpenſorium*, the *Coronarum*, and the two *Laterals*.

The *Suſpenſorium* is that which divides the convex ſurface of the liver into two lobes. This ligament is only a continuation of that folding of the Peritonæum which incloſes the umbilical vein. Its lower part adheres all along the convex ſurface of the liver, which directly correſponds to its ſciſſure, and by this means ſeparates the greater lobe from the leſſer. Its fore part reaches even to the beginning of the ſciſſure, where it has a communication with a particular capſula, of which I ſhall ſpeak hereafter, and all along is faſten'd not only to the appendix of the Sternum called Xiphoides, but alſo to thoſe parts of the Diaphragm which anſwer to it, and at laſt terminates about the middle of the upper and hinder part of the liver at its coronary ligament. This middle ligament alſo adheres obliquely along the upper and hinder part of the ſheath of the *Muſculus Rectus*.

The *Coronary* is not a particular ligament, but rather a name for the immediate faſtening of the upper and hinder ſurface of the liver, and eſpecially of its larger lobe to the aponeurotic part of the Diaphragm correſponding to it; ſo that in this place the ſubſtance of the liver and that of the Diaphragm touch each other, and the membranes of both unite at the circumference of this adheſion, the extent of which is not above two fingers breadth.

As to the lateral ligaments, they ſhew themſelves all along the hinder border of the little lobe, and that part of the greater which is not immediately faſtened to the Diaphragm. Theſe ligaments are formed by the duplicature of the membrane of the liver,

liver, which inſtead of terminating at the hinder border of this inteſtine, reaches about an inch beyond it, where it unites cloſe to that part of the Diaphragm which is oppoſite to it. What I have ſaid, ſhews the liver to be faſtened along all its poſterior border to thoſe parts of the Diaphragm which anſwer to it; only let it be obſerved, that the connexion of the middle part of this hinder border is immediate, and that of all its other parts mediate. Some to theſe ligaments add the immediate adheſion of the liver to the Trunk of the inferior Vena Cava, which extends a-croſs the Diaphragm, to which it is alſo cloſely united, to the heart. The uſe of theſe ligaments is not only to ſuſpend the liver, but alſo to keep it in its proper poſition, and ſecure it from the effects of any violent motion. The liver is chiefly ſupported by the fullneſs of the ſtomach and inteſtines, as they are by the muſcles of the Abdomen: accordingly it is obſerved, that when the liver by the emptineſs of thoſe organs is left to its own weight, a vellication * attended with a very painful ſenſation is the natural conſequence.

As to the umbilical vein, which ſome anatomiſts have placed among the ligaments of the liver, and have attributed to it the uſe of preventing this inteſtine riſing too high towards the Diaphragm, all anatomiſts are ſo far from being agreed in giving it this uſe, that the contrary is by many maintained.

The liver is covered with a thin membrane, which however conſiſts of two laminæ, and between theſe are diſtributed a great number of lymphatic veſſels, viſible both on the convex and concave ſurfaces of this organ. The internal lamina of this membrane ſeems to penetrate the ſubſtance of the liver, and to divide it into a great number of ſmall lobes, which are much more plainly to be diſtinguiſhed in a hog than in a man.

* Twitching, pinching, or a convulſive motion.

The ſubſtance of the liver conſiſts of the aſſemblage of a great number of veſſels of all kinds, which appear diſtributed among a multitude of little bodies, not unlike ſmall grains or veſicles, whoſe internal parts ſeem furniſhed with a ſubſtance like velvet. Mr. *Winſlow* calls them *Pulpous Grains.*

The veſſels which are diſtributed to theſe pulpous grains may be diſtinguiſhed into thoſe which convey ſome fluid into them, and into thoſe which carry it back. The former are the ramifications of the Hepatic artery, thoſe of the Vena Porta, and of the Hepatic nerves. The hepatic artery is a branch of the Celiac trunk, which the Aorta ſupplies at the entrance of the Abdomen.

The *Vena Porta* is a conſiderable trunk of a vein formed by two principal branches, one of which receives the blood in its return from the ſpleen, the Pancreas, and part of the ſtomach. This branch is called the *Vena Splenica.* The other, which receives that from the inteſtines and Meſentery, is called Meſenteric. This trunk of the vein penetrates the ſubſtance of the liver at its concavity, but before it enters, forms as it were two other ramifications, one to the right and the other to the left, and this ſeparation of the Trunk of the Vena Cava is called the Sinus of the Vena Porta. From theſe two branches iſſue ſeveral others of a ſmaller ſize, forming an infinite number of ramifications, which loſe themſelves in the Veſicles of the liver.

Among the veſſels which carry back the fluid from theſe Veſicles, the moſt obſervable are the branches of thoſe veins which correſpond to the Vena Cava, and there empty themſelves of the remainder of that blood which the Vena Porta had carried into the liver. Theſe branches uniting form three conſiderable ducts, called the Hepatic veins, which terminate in the trunk of the lower Vena Cava immediately under the Diaphragm, thro' three

different,

different apertures, the largeſt of which correſponds to the great lobe, the next to the ſmall, and the laſt to the lobe of *Spigelius*.

Theſe ſame veins may alſo be thought to carry off the remainder of the blood flowing from the Hepatic artery, ſince there is no one diſcovered that immediately correſponds to this artery.

The lymphatic veins of the liver run along its concave and convex ſurfaces, forming a moſt admirable kind of net-work. Moſt of theſe empty themſelves into the *Receptaculum Chyli*.

The pulpous grains in the ſubſtance of the liver furniſh each of them a veſſel which is properly an excretory duct of theſe Veſicles. Theſe ducts, which are very numerous, have a communication with each other in the ſubſtance of the liver. They are commonly called biliary, and the union of theſe ducts forms that called the Hepatic, which is about the length of two fingers breadth. It joins to that of the gall-bladder, as I ſhall mention hereafter, where they both form one duct, which afterwards empties itſelf into the Duodenum.

It muſt be obſerved, that all the branches and ramifications both of the Hepatic artery of the Vena Porta and of the nerves and biliary pores, are incloſed in one common membrane, called *Gliſſon*'s Capſula, from the name of the diſcoverer. This author thought it to be a fleſhy ſubſtance, but upon an accurate examination, it appears to be only a continuation of the membrane which covers the liver. The ramifications of the lymphatic veins, and thoſe of the blood veins called the Hepatics, are not incloſed within this capſula.

The gall-bladder is a membranous bag, in ſhape reſembling a pear, with a bottom, a neck, and even a particular canal. It ſeldom exceeds the bigneſs of a ſmall hen's egg. Its ſituation is in the concave part of the great Lobe of the liver, in a de-

preſſion very often of the form of a groove, which lies at its anterior edge, about two fingers breadth from the ſciſſure; ſometimes it protuberates beyond the liver, but eſpecially when its uſual bulk is increaſed by the bile retained in it, or by ſome other cauſe.

Such is the ſituation of this bladder, that in a perſon ſtanding it inclines a little forward, and when lying on the back is almoſt entirely reverſed; its bottom is loweſt when any one lies on the right ſide, and when on the left it tends upward in an oblique direction. Again, theſe poſitions vary according to the different degrees of theſe attitudes, as Mr. *Winſlow* has obſerved. The gall-bladder is found to be uſually joined to the liver, only by a third part of its length and circumference. This bladder touches the Colon, and communicates to it the colour of the liquor it contains.

The canal which is a continuation of the neck of the bladder is called the Cyſtic duct, is about two fingers breadth long, and opens in conjunction with the Hepatic duct into that of the Choledochus. Theſe two ducts are ſo near to each other, that they are even connected by the intervention of ſome membranous fibres, ſo that they do not form a Y, as ſome have aſſerted.

The duct of the bladder does not deſcribe a right line with the neck, for at its very beginning a ſmall membranous ligament faſtened to the outſide of both makes it fetch a compaſs. The conjunction of the Hepatic and Cyſtic ducts forms a third, called common or the Choledochus, which is in length about four fidgers breadth; and after piercing obliquely the different membranes of the hinder part of the Duodenum, it empties itſelf into its cavity, about four fingers breadth beneath the Pylorus.

The gall-bladder conſiſts of ſeveral membranes or tunicles, arranged like thoſe of the ſtomach. The firſt,

firſt, or outermoſt, ſeems a continuation of that which covers the whole liver. The ſecond is muſculous, compoſed of ſeveral fleſhy fibres, diſpoſed three different ways, the firſt being ſtreight, the ſecond oblique, and the third circular.

Betwixt theſe two coats is a cellular membrane, which even penetrates the interval between the fleſhy fibres. The third coat is nervous, and the fourth a papillous ſubſtance. On the outward ſurface of the nervous coat is a moſt wonderful piece of net-work, formed by the ſanguiferous, nervous, and lymphatic veſſels which are diſtributed towards the bladder. The arteries and ſanguiferous veins are called Cyſtic. The arteries are ramifications of the Hepatic duct, and the veins empty themſelves into the Vena Porta, as the Lymphatic veſſels do into the Receptaculum Chyli. As to the nerves, they are branches of the Plexus Hepaticus.

On the inward ſurface of the gall-bladder are ſeveral little holes like thoſe in a honey-comb, which are formed by as many foldings of the papillous tunicles; and ſome modern anatomiſts have alſo diſcovered there the mouths of ſeveral ducts, which inſtead of emptying themſelves into the Hepatic duct, diſcharge themſelves into the cavity of the bladder, and are called Hepati-Cyſtic canals.

The neck of the gall-bladder, and its duct, are alſo furniſhed internally with ſeveral folds of the internal membrane. Theſe folds, according to Mr. *Heiſter*'s obſervations, form a kind of ſpinal ſtaircaſe within and without, and in ſome perſons the winding of a ſkrew, eſpecially when the neck and the duct are full inflated.

The bile is ſecerned in the liver, and that the glandular grains, diſcovered by Mr. *Malpighi* in ſuch abundance throughout its whole ſubſtance, are its real fillers will be admitted, when it is conſidered firſt, that all theſe glandular grains are ſo

many Veſicles including, according to Mr. *Winſlow*'s obſervation, a papillous ſubſtance like that which he ſays is to be found in all the ſecretory ducts; ſecondly, that all the different veſſels that are diſtributed in the liver, terminate in all theſe Veſicles as in their proper centers.

It is therefore conceivable, that ſome of theſe veſſels bring the fluid they contain to theſe Veſicles, and that others receiving ſuch fluids as are in theſe veſſels, convey them elſewhere. The former are the nerves and ramifications of the Vena Porta, and thoſe of the Hepatic artery; the latter are the Hepatic and Lymphatic veins, and the biliary pores or excretory ducts of theſe Veſicles.

From a compariſon of the great quantity of Bile ſecreted in the liver with the bulk of the veſſels which run into it, it may be conjectured that the Vena Porta ſupplies this organ with the bile there filtrated, and the Hepatic artery the blood neceſſary for its nouriſhment; but a conſideration of the nature of Bile, and that of the organs from which the Vena Porta receives the blood which it contains, places it beyond all controverſy.

Bile is a yellow bitter liquor, of a pretty fluid conſiſtence, and compoſed not only of ſeroſities and ſalts, but alſo of oily particles. This compound has a very great reſemblance to ſoap, having nearly the ſame taſte, and alſo the virtue of taking the oldeſt ſpots out of cloaths. As to the organs from whence the different branches of the Vena Porta return, and whence they have drawn, as I may ſay, the Bile it contains, they are the Epiploon, the ſtomach, the inteſtines, the Pancreas, the Meſentery, and the ſpleen.

The Bile thus ſecreted in the liver is again reſorb'd by the biliary pores, which partly transfuſe it into the Hepatic duct, and partly into that receptacle commonly called the gall bladder, thro' ſuch

of

of the biliary pores as correſpond to it, which from this office are called the Hepati-Cyſtic ducts. The Bile ſupplied to the Hepatic duct is continually diſcharging itſelf, tho' more or leſs ſlowly, into the Duodenum thro' the Choledochus, with which it communicates; whereas that which is tranſmitted into the bladder by the Hepati-cyſtic ducts, flows from thence only at certain ſeaſons, of which the moſt uſual is at the digeſtion of food, for being then compreſſed by the ſtomach, the Bile makes its way thro' the Cyſtic duct into the Choledochus, mixes with that tranſmitted thro' the Hepatic duct, and then runs into the Duodenum. This mixture of the Cyſtic Bile and that of the Hepatic, is of great conſequence to a thorough and perfect digeſtion, for theſe two Biles are found to be extremely different from each other, that of the bladder being yellower, thicker, and even more bitter than that of the Hepatic duct, which probably ariſes from the long continuance of the Bile in the bladder.

Some will have the Bile in the bladder to be ſupplied by the Hepatic duct. This Bile, according to them, aſcending thro' the Cyſtic duct, where the Duodenum happens to be inflated, and the Choledochus cannot diſcharge itſelf there on account of its being then compreſſed by the membranes of that inteſtine.

Stony concretions have frequently been found in the bladder, formed by the inſpiſſation and dryneſs of the Bile, as appears from the nature of theſe ſtones, they not only retaining the colour and taſte of Bile, but flaming when thrown into the fire. Some of theſe ſtones have even been known to have come thro' the Cyſtic duct, and the Choledochus into the Duodenum, whence the patient has voided them in ſtools *.

* See *Joan Baptiſti Beanchi* Hiſt. hepat. Editio 3.

The retention of the Bile within the bladder occaſions its inflation, which is ſometimes ſo conſiderable as to appear externally, in which caſe without a nice attention it might be taken for an abſceſs. This obſervation we owe to Mr. *Petit*.

CHAP. VI.

Of the Pancreas.

THE *Pancreas* is a conglomerate gland, of a figure reſembling that of a dog's tongue, of a very faint red colour, and of a pretty firm conſiſtence, ſituated in the epigaſtric region along the inferior part of the ſtomach, running tranſverſly from the *Duodenum* to which it adheres by its proper ſubſtance to very near the ſpleen, to which it is only joined by veſſels or membranes. The ſituation of the Pancreas is ſuch, that we may conſider two ſurfaces in it, one ſuperior and another inferior; two edges, one anterior and another poſterior; and two extremities, one to the right and another to the left ſide; this laſt is leſs conſiderable than the other which touches the *Duodenum*.

The Pancreas is covered with two membranes, which may be diſtinguiſhed into common and proper. The common is formed of the two ſmall leaves of the *Meſocolon*, between which the Pancreas is ſituated. Its proper membrane immediately covers its ſubſtance, which is compoſed of ſeveral glandular granulations, interſperſed with a great number of veſſels, ſome of which go to the Pancreas while others come from it. Thoſe which furniſh the Pancreas with any liquor, are the arteries and nerves. Thoſe which bring the liquors back from it are the ſanguiferous and lymphatic veins, and the excretory ducts of the glands.

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The arteries are diſtributions of the Cœliac trunk, and principally of the Splenic branch. The nerves are furniſhed to it by the eighth pair, and the intercoſtal. As for the ſanguiferous veins, they diſcharge their contents into that which returns from the ſpleen, and is called Splenic.

The external ducts of the Pancreas are very numerous, and there is even reaſon to believe that there are as many of them as there are glands which enter its compoſition. All theſe ducts unite with each other, and from their union there ariſes one which is common to them, and in which they diſcharge the liquors which they have received from the glands; this is called the *Pancreatic Duct*, or that of *Verſungus*, from the name of him who diſcovered it. It runs along the Pancreas till about the middle of its thickneſs, and diſcharges its contents into the Duodenum in paſſing its coats, and moſt frequently by an aperture which is common to it with the Cholodoch duct. It ſometimes happens that the *Pancreatic* duct terminates in the end of the *Choledochus*, and there have been ſome ſubjects in which the Pancreatic duct has been found double.*

To the extremity of the Pancreas, next to the *Duodenum*, is joined a glandulous body of the ſame nature with the *Pancreas*, for which reaſon it is looked upon as a ſecond *Pancreas*. This laſt is not much more than an inch and a half long, and about as much in breadth. In it we diſcover a common excretory duct, which alſo diſcharges its contents into the Duodenum, a little below the inſertion of the great pancreatic duct. Sometimes, inſtead of diſcharging itſelf into the Duodenum, it opens into the pancreatic duct itſelf.

The uſe of the Pancreas is to ſecrete a liquor call'd the *Pancreatic Juice*, which is of the ſame nature with

* See Blaſij Obſ. Med. rarior.

the

the *Saliva*, and in conjunction with the Bile ſerves to perfect the Chyle.

CHAP. VII.

Of the Spleen.

THE *Spleen* is an organ of a ſoft conſiſtence, eaſily extended, and of a rediſh blue colour; it is ſituated obliquely in the left Hypochondrium under the Diaphragm, between the falſe ribs and the ſtomach, and immediately above the left kidney.

The figure of the Spleen is a long oval, being generally ſeven or eight fingers breadth in length, and about four or five in breadth.

The Spleen is maintained in its ſituation not only by the ſupport furniſhed to it by the adjacent Viſcera, but alſo by the membranous ligaments which fix it to the Diaphragm, and ſometimes to the ſtomach. It is alſo adherent to the ſtomach, the Colon, and the left kidney, by means of the Epiploon, and even by veſſels both ſanguiferous and nervous, which run from the Spleen to the adjacent parts. Notwithſtanding theſe different means which ſeem to fix the Spleen in its natural ſituation, it has been found to deſcend into the Hypogaſtrium, as I have before obſerved; but this only happens in a preternatural ſtate of this organ.

In the Spleen we are to conſider its ſurfaces, its edges, and its extremities. It has two ſurfaces, one internal, which being turned towards the ſtomach, is unequally concave, and another external, which being turned towards the ribs, is convex, to accommodate itſelf to their concavity. Of its extremities, one is anterior and the other poſterior; and its edges are diſtinguiſhed into ſuperior and inferior. I have

ſaid that the internal ſurface is unequally concave, for it is divided into other two ſmall ſurfaces by a kind of groove or furrow, which runs along all its length; and it is in this groove that the veſſels particular to the Spleen penetrate its ſubſtance.

Theſe veſſels are arteries and veins, both ſanguiferous and lymphatic. The principal artery of the Spleen is called *Splenic*, and derives its origin from the Cœliac trunk. The vein receives the ſame name, and diſcharges itſelf into the trunk of the *Vena Porta*, ſliding along the inferior ſurface of the Pancreas. We diſcover but very few Lymphatic veſſels on the human Spleen, whereas there is a great number on that of a calf, which form an admirable piece of network. The nerves of the Spleen are very numerous, and ariſe from the Splenic Plexus which, as I ſhall afterwards ſhew, is formed by the eighth pair and the intercoſtal.

We obſerve that the Splenic artery, whoſe bulk is conſiderable in compariſon of the bulk of the Spleen, runs in a winding direction to that organ.

The arteries, veins, and nerves having entered the Spleen, are there divided and ſubdivided into a great number of ramifications, and there accompany each other every where to the laſt extremities of their diviſion. They are here included in a common cellular Capſula. In the whole extent of the Spleen, between theſe different ramifications, we find an univerſal diſcharge of the blood extravaſated and ſtop'd in a kind of ſpongeous and very fine texture, which appears in the whole extent of the Spleen, and at laſt terminates in almoſt imperceptible Cellules, which communicate with each other. Theſe Cellules are very viſible in the Spleen of a ſheep.

It is obſervable, that in the Spleen of a calf or a ſheep we find no venous ramifications. The Splenic vein having entered into the Spleen runs about

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an inch into its ſubſtance, after which inſtead of the vein we ſee nothing but ſinuoſities, half open'd every where, and diſpoſed in the manner of branches.

The Spleen of a calf is covered with two membranes, whereas that of a man has but one, which is of a very compact texture, and capable of retaining the air blown into it.

'Tis very difficult to determine the uſe of the Spleen; 'tis however probable, that the blood paſſing thro' the ſubſtance of this organ, receives ſome particular alteration by the mechanical retardment of its courſe, and that by the action of the great number of nerves diſtributed there, it becomes more proper for the ſecretion of the Bile which is to be made in the liver.

CHAP. VIII.

Of the Capſulæ Atrabiliares.

THE *Capſulæ Atrabiliares*, called alſo *Renes Succenturiati*, and the *Renal Glands*, are two glandulous parts, ſituated one on each ſide, a little obliquely at the ſuperior and ſomewhat internal part of the kidney, which they generally embrace, being joined to the kidney by a pretty fine cellular texture; and they are covered by the external covering of the kidney called the *Membrana Adipoſa*, becauſe it is generally loaded with fat.

The ſubſtance of the *Capſulæ Atrabiliares* is ſoft and ſpongeous, covered with a very ſlender membrane, and of a more or leſs deep yellow colour. The bulk of theſe glands is not the ſame at all ages, for in a fœtus we obſerve that their bulk is equal to that of the kidney, and ſometimes more conſiderable. Their figure is leſs regular in an adult than

than in a fœtus, ſince in this laſt they reſemble the ſuperior part of a helmet. We may diſtinguiſh in them three ſurfaces, three edges, and two points.

Each of the Capſulæ Atrabiliares has nerves, an artery, and a vein, both of the ſanguiferous and lymphatic kind. In the thickneſs of each Capſula we obſerve a very narrow cavity, which is greater or ſmaller according to a perſon's age, and in which we find a humour of a more or leſs deep yellow colour. We obſerve that the vein communicates with the cavity of the Capſula, ſo that by blowing into the latter the air penetrates into the former.

Neither the uſes of the *Capſulæ Atrabiliares*, nor of the humours which they contain, are hitherto known.

CHAP. IX.

Of the Kidneys, Ureters, and Bladder.

THE kidneys are two conglomerate glands, of a firm conſiſtence, and of a rediſh brown colour. They are generally ſituated poſteriorly in the lumbar regions, without the Peritonæum, and in its cellular texture, the one on the right and the other on the left, between the laſt of the falſe ribs and the *Os Ileum*. The right is ſupported by the inferior part of the liver, and the left is immediately under the ſpleen: this laſt is generally a little more elevated than the other.

There have been ſubjects in which the two kidneys have been united by their inferior parts; at other times one of the kidneys has been found in the Hypogaſtrium, while the other remained in its natural ſituation. *Blaſius* ſays, he ſaw a ſubject in which

which there were three kidneys, namely, two in the left and one in the right ſide, and each had its particular Ureter*.

The uſual bulk of each kidney is about five or ſix fingers breadth in length, three in breadth, and a half in thickneſs. Their figure reſembles that of a *French* bean. The moſt exact Anatomiſts, in each kidney diſtinguiſh its ſurfaces, edges, and extremities: its ſurfaces are anterior and poſterior, both of which in a fœtus are divided into ſeveral lobes joined to each other; but in adults theſe two ſurfaces are ſmooth, and the poſterior is ſomewhat round.

The kidney has two edges, one turned to the Vertebræ, that is, to the middle of the body, and the other to the oppoſite ſide. This laſt is convex and round, whereas the former is concave and grooved towards its middle, and in this groove we find a depreſſion into the ſubſtance of the kidney, and thro' this depreſſion or ſinuoſity thoſe veſſels paſs which enter into the kidney. The extremities of the kidney are ſuperior and inferior, the former of which is ſmaller than the latter.

Before I examine the ſubſtance of the kidney, I ſhall ſay ſomething of the veſſels which enter into it; theſe are diſtinguiſhed into ſuch as carry fluids to it and from it. The veſſels which carry liquors into the kidney are the arteries and nerves, and thoſe which carry them from it are the ſanguiferous and lymphatic veins, and the Ureter or excretory duct of the kidney.

The arteries diſtributed to the kidneys are called *emulgent* or *renal*, of which there are generally two, one for each kidney. They ariſe from the inferior Aorta oppoſite to the kidneys, and running a little from above downwards, they penetrate the depreſ-

* See *Blaſij* Obſ. Med. rarior.

ſion

ſion obſervable in the middle of their groove, and are diſtributed thro' all their ſubſtance, forming ſeveral arches, from which ariſe a great number of capillary branches, which advance to the external ſurface of the kidneys, where they form as it were ſo many ſtars, for which reaſon Mr. *Ruyſch* calls the ſurface of the kidneys *Subſtantia Stellata.*

The nerves are furniſhed to the kidneys by the Renal Plexus on each ſide. They enter into the kidneys at the ſame parts with the arteries, and accompany them in all their diſtributions.

The ſanguiferous veſſels begin in the ſubſtance of the kidneys, by ſeveral capillary ramifications which accompany thoſe of the arteries. Theſe ramifications by their union afterwards form branches, and at laſt the trunk of the emulgent veins, which diſcharge themſelves into the *Vena Cava inferior.*

As for the lymphatic veins, they ariſe from the whole ſubſtance of the kidney by ſeveral ramifications, which reunite into one or two trunks, which run along the emulgent veins to diſcharge themſelves into the Receptaculum Chili.

The fifth veſſel belonging to the kidney is called the *Ureter*, which is a membranous canal, which receives the urine in proportion as it is ſecreted in the kidney, in order to convey it into the bladder.

The kidney is covered with two membranes, the firſt of which is no more than the cellular texture of the peritonæum charg'd with a great deal of fat in corpulent perſons. This covering is generally call'd the *Membrana adipoſa*, or common membrane of the kidney, becauſe it covers not only the kidney but alſo the *Capſula atrabiliaris* of the ſame ſide. This covering being removed we find that which is

proper

proper to the kidney, which is a membrane every where ſurrounding that organ. It is compoſed of two laminæ united by a very fine cellular texture. The outermoſt touches the common covering, and the innermoſt is cloſely united to the ſubſtance of the kidney. This laſt furniſhes the veſſels which penetrate the kidney, with a ſheath which is common to them, and between theſe two laminæ, the lymphatic veſſels run.

The kidney is compoſed of three different ſubſtances, that which is next to its external ſurface is call'd *cortical*, that which ſucceeds it is call'd *tubular*, and the third *papillous*. Theſe three ſubſtances being carefully examined, we find that the firſt is formed of the aſſemblage of a vaſt number of ſanguiferous and nervous veſſels, among which, according to *Malpighi*, there are ſeveral glandulous granulations. The ſecond is formed of a great number of ducts which *Bellini* has call'd *urinary*, and which alſo form the third or *papillary* ſubſtance compoſed of ten or twelve eminences call'd papillæ, whoſe figure is nearly pyramidal, having each a baſe, and a blunt point. This laſt communicates with a cavity in the kidney, which is near its groove, and thro' which is introduced, the extremity of the membranous duct call'd the *Ureter*, which lines this cavity of the kidney, and afterwards forms ſeveral elongations which embrace the papillæ like ſo many funnels; and there are ſometimes two papillæ included in one funnel.

There are generally but two *Ureters*, one for each kidney. Theſe are two membranous ducts about the bulk of a quill. However they are a little more dilated near the kidnies, where they are generally divided into two branches. Theſe ducts extend from the kidnies to the bladder to which they run obliquely and with very little inflexion, being inſerted into it poſteriorly, about two inches above its

neck, and at the ſame diſtance from each other. The inſertion of the ureters into the bladder, is alſo oblique, as I ſhall afterwards ſhew. The ureters are compoſed of different membranes or coats, the thinneſs of which hardly permits us to determine their natures, tho' 'tis generally thought that they have a great reſemblance to thoſe of the inteſtines.

The bladder is a kind of membranous ſack, ſituated in the anterior part of the pelvis immediately behind the *Oſſa pubis*, above which it is raiſed when full. It is of a ſhort oval figure, being broadeſt before and behind, than from one ſide to the other, and broader at the bottom than the top, when it is full.

The bladder does not always preſerve its uſual figure, which may be changed by the compreſſions which it receives from the adjacent parts, which happens more frequently in women than in men, and eſpecially in women who have born children. Its bulk is alſo greater in ſome than in others, which depends on the quantity of urine retained in its cavity. The ſituation of the bladder in the pelvis, is out of the *Peritonæum*, this membrane only adhering to its poſterior and ſuperior part. From this we ſee that it is poſſible to open the bladder in its anterior part for the extraction of a ſtone contained in its cavity without touching the peritonæum, and conſequently without laying a foundation for the deſcent of any inteſtine. The moſt extenſive part of the bladder, is its bottom or body, and its narroweſt portion, which is an elongation of its anterior and inferior part, is call'd its neck.

The bladder is compoſed of ſeveral membranes or coats, the outermoſt of which comes from the peritonæum and covers its poſterior and inferior part, the reſt of the bladder being included in its cellular texture. The portion of the peritonæum, which covers the poſterior part of the bladder, there

forms a very prominent tranſverſe folding, when the bladder is empty, but which is effaced in proportion as it fills. This folding advances on the ſides of the bladder, and there forms two lateral ligaments.

The ſecond coat of the bladder is fleſhy, and compoſed of ſeveral plans of fibres the outermoſt of which are longitudinal, the middle oblique, and the innermoſt tranſverſe. The third, call'd *nervous*, is compoſed like thoſe of the inteſtines, of ſeveral tendinous fibres, which croſs each other obliquely. Some add a fourth, which they ſay correſponds to the papillous membrane of the inteſtines, but which is not diſcovered without great difficulty.

The nervous membrane forms within the bladder ſeveral eminences, or irregular wrinkles which are principally obſerved, when the bladder is not too much diſtended but remains in a kind of contraction. The whole internal ſurface of the bladder is pierced with a great number of ſmall holes thro' which a mucilaginous lymph flows, which defends the bladder againſt the too quick impreſſions of the urine.

In the internal ſurface of the bladder, and in the inferior part of its body, we are alſo to conſider three apertures, one anterior and two poſterior. Theſe laſt are the orifices of the Ureters, which have obliquely paſſed thro' the membranes of the bladder, from above downwards. Theſe two apertures are ſomewhat oval and are even narrower than the ureters immediately before their entry. The third aperture correſponds to the neck of the bladder and the duct continuous to it call'd the *Urethra*, which in man terminates at the extremity of the glans, and in women at the ſuperior part of the *vagina*, paſſing in both under the oſſa pubis, and thro' a membranous and triangular ligament fixed by two of its edges to the inferior branches of the oſſa pubis, and

continuing along their cartilaginous arch, to the Symphyſis where it terminates.

I ſhall ſpeak of the compoſition and connexions of the urethra, when treating of the genital parts of both ſexes. I ſhall only here conſider the length of this duct, its direction, and its capacity, which are very different in men from what they are in women; for in the former we obſerve that the *urethra* is ten or twelve inches long, and makes two curvatures like thoſe of a roman S, whereas in women this duct is hardly two inches long, and forms only one ſmall curve. 'Tis alſo obſervable that the capacity of the urethra is more conſiderable in women than in men.

The principal connexions of the bladder in man, are with the *Rectum* and the *Veſiculæ ſeminales*, and in women, with the *Vagina*, and in both ſexes with the *Oſſa pubis*, not only by ſeveral ligamentary fibres, but alſo by ſome ſmall parcels of fleſhy fibres which ariſe from them, and which running obliquely to the neck of the bladder, embrace it by their intercroſſing, confounding themſelves with the tranſverſe fibres of its fleſhy coat. This intercroſſing of the fleſhy fibres on the neck of the bladder, is what Mr. *Winſlow* ſuſpects to be a true ſphincter, which is fortified by ſome fibres of the *Sphincter Ani*.

In the middle of the ſuperior part of the bottom of the bladder, there is a ligamentary cord call'd the *Uracus* which terminates in the navel. This cord appears to be a continuation of the membranes of the bladder. It is accompanied with two arteries call'd *umbilical*, whoſe particular uſe regards the *Fœtus*. They ariſe from the internal *Iliacs* or hypogaſtrics, and running along the lateral parts of the bladder to which from their beginning they furniſh ſome ramifications, they terminate at the navel. The cavity of theſe arteries is deſtroy'd in a great

portion of their extent, and is only to be found in a fœtus as I ſhall aſterwards ſhew. The veins of the bladder correſpond to the arteries diſtributed to it. As for the nerves, thoſe call'd *crural* furniſh it with ſome ramifications, as well as the *Par Sacrum*. It alſo receives ſome filaments from the inferior meſenteric *Plexus*.

As for the uſe of the parts I have deſcribed, the kidneys ſeparate from the maſs of blood, that excrementitious liquor call'd *Urine*. It is in the cortical part of the kidney, and alſo according to ſome, in its tubular part, that this ſecretion is made. The urine afterwards paſſes into the *Papillæ*, where it is received into the ſmall funnels which I have ſaid embrace them, and at laſt into the cavity of the kidney which diſcharges it thro' the ureters into the bladder.

The urine conveyed into the bladder is only diſcharged from it, in a certain time, on account of the ſphincter which embraces its neck, and like a ſpring ſhuts the aperture, which I have ſaid correſponds to it, and it continues there till by the lively impreſſions it makes on the ſides of the bladder it occaſions the contraction of the fleſhy fibres of its body, which contraction being joined to that of the diaphragm and abdominal muſcles which act at the ſame time, is ſtronger than that of the ſphincter, and obliges it to yield, which affords a free paſſage to the urine.

From this it is evident, that the diſcharge of the urine contained in the bladder, ſuppoſes not only a diſpoſition in the fleſhy fibres of its body to contract themſelves, but alſo a flexibility in the fibres of the ſphincter, which permits it to yield. In a word, experience every day ſhews that the retention of urine which ſome improperly confound with its ſuppreſſion, which ſuppoſes a defect of the filtration of this liquor thro' the kidneys, happens equally by the

the relaxation of the fleſhy fibres of the body of the bladder, as by the inflammation of its ſphincter. But in vain would the urine be eaſily diſcharged from the bladder if the urethra did not permit it to flow out. It is therefore neceſſary that the urethra ſhould be free from all extraneous bodies, even thoſe which being adjacent might compreſs it ſo as to diminiſh or totally block up its cavity.

The evacuation of the urine, next to that by tranſpiration, is the moſt conſiderable. The matter which eſcapes in theſe two evacuations and in ſweat is nearly of the ſame nature, ſo that we ought not to be aſtoniſhed that they ſo nearly reſemble each other, and that one becomes more copious in proportion as another is diminiſhed.

The analyſis of the urine proves that this liquor is a mixture of different parts, among which, ſuch as are aqueous predominate over the ſulphureous, ſaline and terreſtrial parts, which are found in it in a more or leſs equal quantity.

When urine is in its natural ſtate, it has the fluidity of water, but is more weighty. Its ſmell of itſelf is neither good nor bad, tho' a little nauſeous. Its heat is ſo temperate that it is hardly perceived when it is diſcharged, if there is no fault in the urethra.

The colour of the urine varies very much, and this variety depends not only on the age, temperament and nature of the aliments both ſolid and liquid, but alſo on the ſeaſons and other circumſtances. We may however ſay, that its moſt uſual colour is that of a yellow citron more or leſs deep.

CHAP. X.

Of the Organs in Man ſubſervient to Generation.

WE may diſtinguiſh the organs ſubſervient to generation in man, into three claſſes, with regard to their different functions. The firſt comprehends thoſe which ſeparate the *Semen*. Under the ſecond are included thoſe which retain it for ſome time, or which ſerve as a receptacle to it; and the third includes thoſe organs deſtin'd to tranſmit the ſemen into the parts of the women.

The organs of the firſt claſs are the Teſticles, thoſe of the ſecond the Veſiculæ Seminales, and thoſe of the third all the parts which compoſe the Penis.

ARTICLE I.

Of the Teſticles.

THE Teſticles are two glandular bodies generally ſituated without the belly, and contained in a common covering call'd the ſcrotum. I ſay the Teſticles are generally ſituated without the belly, and in the ſcrotum; for there are ſubjects tho' very rarely, in which theſe organs remain concealed in the lower belly; and in new born infants it ſometimes happens that the Teſticles are near the rings of the *Muſculi obliqui externi*, and ſometimes in the rings themſelves. This has ſo impoſed on ſome as to make them think the tumor form'd by the Teſticles, an *inguinal hernia*, and from this miſtake they have very impoperly applied the bandage uſed for that diſorder.

Blaſius ſays he found in a man of thirty years of age three Teſticles, namely, two on the right and one

one on the left ſide which had each its particular veſſel, and the ſame bulk and conformation *.

The figure of the Teſticles is oval, a little flat on both ſides, ſo that we may conſider two ſurfaces in them, one internal and another external; two edges, one ſuperior and another inferior; two extremities, one anterior and another poſterior. As for the uſual bulk of the Teſticle, it is nearly that of a pigeon's egg.

The Teſticles are covered with ſeveral membranes or coverings, which authors have diſtinguiſhed into common and proper. The firſt of the common membranes is by Anatomiſts call'd the *Scrotum*, which is only a continuation of the ſkin, interſpers'd with ſebacious glands, and a number of bulbous roots of hairs. It is divided externally into two parts, one to the right and another to the left, by a ſomewhat prominent and unequal line in form of a ſeam, for which reaſon it is call'd Raphé. This extends from the ligament which keeps the *Prepuce* adherent to the *Glans* to the *Anus*, and the ſpace between the *Scrotum* and the *Anus* is call'd *Perinæum*.

The ſcrotum is covered internally with a fleſhy membrane (which ought to be look'd upon as a true cutaneous muſcle) which adheres by a kind of aponeurotic expanſion to the inferior branch of the *Os pubis*. This fleſhy membrane is call'd the *Dartos*, and, according to the obſervations of Mr. *Raw*, furniſhes a particular covering to each Teſticle; and by the union of theſe two fleſhy coverings that partition is form'd, which in one part adheres to the *Urethra*, and in another to that portion of the ſcrotum which is oppoſite to the *Raphé*. It is the contraction of the *Dartos* which produces the wrinkles and corrugation of the *Scrotum* which happens prin-

* *Blaſ.* Obſ. Med. rarior.

cipally when a perſon is expoſed to cold or comes out of the bath.

The *Scrotum* and *Dartos* receive their arteries from the hypogaſtrics; there is one artery diſtributed over the partition. The veins accompany the arteries, and diſcharge themſelves into the hypogaſtric veins. The nerves come from the *Par Sacrum*.

The membranes proper to each Teſticle are three in number: The firſt is call'd *Vaginalis*, formed of ſeveral membranous cellules which are continuous to the cellular texture of the *Peritonæum*. It not only covers all the particular veſſels of the inteſtine, by adhering cloſely to them, but alſo the body of the Teſticle. This membrane is covered (principally along its lateral external part oppoſite to the partition of the ſcrotum) with an expanſion of the *cremaſter Muſcle* or the *ſuſpenſor Teſticuli* which riſes not only from the inferior part of the *obliquus internus*, but alſo from the tendinous cord or ligament of *Fallopius*, form'd, as I have before ſaid, of the union of the oblique and tranſverſe muſcles in their inferior part. This muſcle deſcends along the *Tunica Vaginalis*, and in proportion as it approaches the Teſticles, the fleſhy fibres which compoſe it are divided, and their expanſion ſeems to form a kind of thick membrane, which ſeveral Anatomiſts have call'd *Erithroide* or reddiſh membrane, which is cloſely united to the *Voginalis*. The *Tunica Vaginalis* is in its inferior part adherent to the partition of the *Scrotum* by pretty ſtrong membranous fibres. Below the *Tunica Vaginalis* we obſerve a ſack particular to the body of the Teſticles which is call'd the *Periteſtis*, becauſe it every where ſurrounds that organ, being only adherent to the *Epididymis*. The laſt membrane which is proper to the Teſticle, and which immediately touches its ſubſtance is call'd the *Albuginea*. It is of a cloſe texture, its external ſurface

face is ſmooth and poliſhed, and from its internal ſurface are detached ſeveral membranous ſmall leaves, which penetrate the ſubſtance of the Teſticle, by forming ſeveral ſmall partitions which divide it as it were into ſo many ſmall portions. All theſe partitions are re-united as it were in a ſingle point, which is continued in all the length of the Teſticle, not in its middle, but approaching to one of its edges. *Hygmore* pretends that the re-union of all theſe partitions forms a hollow cylinder or common tube, in which the veſſels of the ſubſtance of the Teſticle communicate. This part is call'd *Corpus Hygmori.* This membrane after having covered the Teſticle ſeems to prolong itſelf to include alſo the *Epididymis*, of which I ſhall afterwards ſpeak.

The Teſticle is a conglomerate gland which has its particular veſſels; namely, nerves, arteries and veins, both ſanguiferous and lymphatic, as well as ſecretory and excretory veſſels.

The arteries which go to the Teſticle are call'd ſpermatic. They generally derive their origin from the anterior part of the Aorta about an inch below the Emulgents. At a ſmall diſtance from their origin, they unite by means of the cellular texture, with the ſpermatic veins, and not by anaſtomoſes, as *Leal Lealis* has pretended. Coming afterwards near the rings of the *Obliqui Externi* they are alſo joined to the nerves of the Teſticles as well as to the *Vaſa Deferentia* which return from them; and all theſe veſſels which are joined by the Tunica Vaginalis, in which they are included, compoſe what we commonly call the cord of the ſpermatic veſſels. Beſides the collateral ramifications, which the ſpermatic arteries furniſh in deſcending, when they are arrived at ſome diſtance from the Teſticle, they are divided into two principal branches, one of which is diſtributed to the ſubſtance of the Teſticle, and the other to the Epididymis. The

The ſpermatic veins derive their origin from the ſubſtance of the teſticles by a great number of very fine branches, and from the union of theſe branches more conſiderable ramifications are produced, which communicate with each other in different parts; and as theſe branches are more numerous towards the Teſticles, and are afterwards diminiſhed in proportion as they approach the Vena Cava, they form a kind of body, called *Pyramidal* on account of its figure; it is alſo called *Corpus Pampiniforme.* The ſpermatic vein on the right ſide generally diſcharges itſelf immediately into the trunk of the Vena Cava inferior, about an inch below the *Emulgent*, and that on the left ſide diſcharges itſelf into the *Emulgent* of the ſame ſide.

The lymphatic veins which return from the Teſticles follow the courſe of the ſanguiferous veins, and diſcover themſelves in a great number in living animals.

As for the nerves diſtributed to the Teſticles, they follow the courſe of the arteries, and are furniſhed by the the Renal Plexus on the ſame ſide, and by the firſt lumbar pair.

The ſubſtance of the Teſticles is vaſcular. It is formed principally of a vaſt number of very fine veſſels, which permit the colour of the liquor they contain to be ſeen. Theſe veſſels are turned in different manners, and form ſeveral bundles, which are ſupported by the membranous partitions which I have ſaid are furniſhed by the *Tunica Albuginea.* On the ſuperior edge of the Teſticle we perceive a long body, whoſe figure reſembles that of a caterpiller or ſilk-worm. It is called the Epididymis on account of its ſituation. It is alſo called *Paraſtati*, and is covered as well as the Teſticle by the *Tunica Albuginea.* At the aperture of this membrane we diſcover the ſubſtance of the *Epididymis*, which is the ſame with that of the Teſticle; and the veſſels which compoſe

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it form a prodigious number of ſerpentine revolutions. The Epididymis terminates in its extremities by two eminences, of which the moſt conſiderable is called the head, and the ſmalleſt the tail of the *Epididymis*; and at this laſt eminence begins the *Vas Deferens*, which aſcends all along the ſpermatic veſſels, and after having paſſed thro' the ring of the *Obliquus externus*, and under the laſt fibres of the *Obliquus internus* and the *Tranſverſalis*, it ſeparates from theſe veſſels, and goes to the poſterior and inferior part of the bladder, inſinuating itſelf into the interſtices of the two Veſiculæ Seminales which are placed there, and into which theſe ducts diſcharge themſelves. In this courſe they paſs behind the Ureter of the ſame ſide, which they alſo croſs.

ARTICLE II.

Of the Veſiculæ Seminales.

THE Veſiculæ Seminales are two membranous and cellular receptacles, ſituated at the poſterior and inferior part of the bladder. Their uſual length is three fingers breadth, and their breadth an inch. Their figure pretty much reſembles that of a ſmall, flat pear. Their broadeſt part is called the bottom, and their narroweſt the neck, to which is joined a particular duct, called the ejaculatory duct.

In the neck of the Veſiculæ Seminales, the Vaſa Deferentia terminate. The two pretty ſmall ducts of theſe Veſiculæ, called *Ejaculators*, loſe themſelves in the Urethra near the neck of the bladder, after having paſſed thro' a glandulous body of a pretty firm conſiſtence, which embraces the neck of the bladder and the beginning of the Urethra. Theſe glandulous bodies are called *Proſtatæ*, and alſo *Superiores*, to diſtinguiſh them from the other two glands, called

called *Proſtatæ Inferiores* on account of their ſituation.

The ſuperior *Proſtatæ* are two conglomerate glands, ſo united with each other that they form but one, whoſe excretory ducts, which are twelve in number, open themſelves in the Urethra round a ſmall eminence, nearly of an oval figure, ſituated at the beginning of that duct: this eminence is called the *Veru-montanum*, and in its middle we obſerve the mouths or the orifices of the ejaculatory ducts.

ARTICLE III.

Of the Parts which compoſe the Penis.

THE parts which compoſe the Penis may from their ſituation, be diſtinguiſhed into containing and contained.

Among the containing parts we count the ſkin, the cellular texture below it, and a particular membrane which ſeems to be formed by the ſpreading of a ligament which fixes the Penis to the ſymphyſis of the *Os Pubis*, and which is called the Suſpenſor of the *Penis*.

The ſkin which covers the Penis is folded back at its extremity, and this folding is called the Prepuce, which adheres to the inferior part of the glands, by a ligament called the *Frenum* or Bridle.

The contained parts of the *Penis* are the *Corpora Cavernoſa*, the *Urethra*, and the *Glands*. The *Corpora Cavernoſa* are two ducts, which derive their origin from each ſide at the branch of the Iſchium, advance to the inferior part of the *Os Pubis*, where theſe two bodies unite with each other to form but one, and continue thus united to the poſterior part of the glands, where they terminate. All along the *Corpora Cavernoſa* we obſerve two grooves, the moſt conſiderable is below, and receives the greateſt

greateſt part of the Urethra, and the ſecond is above, and is called *Vena ipſius Penis.*

The membrane which forms the ſides of the Corpora Cavernoſa ſeems to be made of ſeveral very fine ligamentary fibres, which croſs each other in various directions, and their cavity is poſſeſſed by a prodigious number of fibres, which ſeem to be of the ſame nature with thoſe which form the ſides, and which by their different interlacement produce a great number of Cellules which communicate with each other. From the union of the Corpora Cavernoſa to their anterior extremity, we internally obſerve a partition formed of ſeveral fibres which appear tendinous, and which extend in a ſtreight line from one of the ſides of the Corpora Cavernoſa, to the other oppoſite to the ducts which I have mentioned, leaving intervals between them, which eſtabliſh a communication between the *Corpora Cavernoſa.*

The Urethra is that duct which is continuous to the neck of the bladder, and terminates at the extremity of the glands. Its beginning is covered by the ſuperior proſtate gland, and its inferior part is only embraced by ſome fleſhy fibres for about two fingers breadth; and all the reſt of the Urethra, or that portion which extends from the inferior part of the Os Pubis to the glands, is covered every where by a texture formed of ſeveral membranous Cellules. This is called the ſpongeous texture of the Urethra, and forms not only the ſubſtance of the glands, but alſo in its beginning that eminence which is called the bulb of the Urethra. The Cellules of this texture do not communicate with thoſe of the Corpora Cavernoſa.

The *Gland* is the moſt ſenſible of all the parts ſubſervient to generation. In it we are to conſider its crown, which is its largeſt portion, on which are ſeveral ſmall eminences which have been taken for

nervous

nervous Papillæ, tho' according to Mr. *Littre* they are only ſebacious glands which furniſh a pinguious liquor, which being inſpiſſated forms the Sordes, which is often collected between the glans and the Prepuce. This humour is ſometimes altered, and the purulent matter furniſhed by the ulceration which it has occaſioned both on the glans and in the internal part of the Prepuce, has impoſed on ſeveral who have looked upon this diſcharge as the conſequence of a virulent Gonorrhea, purely for want of examining whether this matter came from the Urethra or from below the Prepuce, which is very neceſſary, as well for the prognoſtic as the cure of the diſorder.

We obſerve that the Urethra is ſomewhat dilated in the middle of the glans. That cavity of the Urethra which correſponds to its dilated part is call'd *Foſſa Navicularis.* The Urethra being opened in all its extent, we diſcover the mouths of ſeveral ducts in it. In its beginning near the neck of the bladder, we obſerve the aperture of the ejaculatory ducts, and thoſe of the excretory ducts of the ſuperior *Proſtatæ*; and at ſome diſtance from theſe ducts we find the orifices of the excretory ducts of the inferior *Proſtatæ.* Theſe are two glands ſituated immediately at the ſide of this eminence of the ſpongeous texture of the Urethra, called the Bulb. The bulk of theſe glands comes near to that of a ſmall bean, and the excretory duct which ariſes from both is very fine, and its length is about two inches. Theſe ducts paſs obliquely thro' the ſpongeous texture of the Urethra, and diſcharge themſelves into its cavity, about three inches from the *Verumontanum.*

We alſo obſerve in all the extent of the Urethra, but principally along its ſuperior part, the mouths of ſeveral ducts, which obliquely penetrate the thickneſs of the ſpongeous texture of the Urethra,

and

and terminate in many glandular grains found in it; theſe are called the blind ducts, or the Lacunæ of the *Urethra.*

The veſſels of the Penis are its nerves, arteries, and veins, both ſanguiferous and lymphatic. Theſe veſſels may be diſtinguiſhed into external and internal; the external are diſtributed to the coverings of the Penis, and the internal go to the Corpora Cavernoſa and the Urethra.

The nerves diſtributed over the ſkin of the Penis riſe from the two firſt lumbar pairs, the arteries come from the *crural* artery, the veins diſcharge themſelves into the crural vein, and the Lymphatics run to the glands of the *Groins.*

As for the internal veſſels, the nerves come from the *Par Sacrum*; the arteries, which are three on each ſide, are furniſhed by the internal *Iliacs* or *Hypogaſtrics.* The firſt of theſe arteries creeps along the ſuperior part of the *Corpora Cavernoſa*, to which it is diſtributed. The other two are below; one of them loſes itſelf in the ſpongeous texture of the Urethra, and the other having alſo furniſhed ramifications to this texture, loſes itſelf in the Corpora Cavernoſa.

As for the ſanguiferous veins, they diſcharge themſelves in the Hypogaſtrics. The principal of theſe veins creeps along the ſuperior part of the Corpora Cavernoſa, being placed on the middle of the Penis, and the arteries at its ſide: this is called *Vena ipſius Penis.* As for the lymphatic veins, their courſe is not eaſily determined on account of the difficulty of ſeeing them. It is thought however, that they diſcharge themſelves into the Hypogaſtric veins.

It is proper to obſerve that the arteries, whether external or internal, which go to the Penis, all communicate with each other, and alſo that the veins do the ſame.

The

The Penis has ſix muſcles, three on each ſide. One ſerves for erection, and is called *Erector*, and the two others belong principally to the Urethra. Of theſe laſt, one ſerves to preſs the portion of that duct which correſponds to it, and conſequently to accelerate the courſe of the liquor which flows in it, for which reaſon it is called *Accelerator*; and the third, which is thought ſubſervient to the dilation of the Urethra, is from the direction of its fibres called *Tranſverſe*.

The *Muſculi Erectores*, alſo called *Iſchio-cavernoſi*, have their fixed adheſion on each ſide on the internal ſurface of the tuberoſity of the *Iſchium*, cover the beginnings or roots of the Corpora Cavernoſa, and terminate in them about three fingers breadth above their fixed adheſion, ſpreading over their ſurface by a great number of tendinous fibres.

The *Muſculi Acceleratores*, called alſo *Bulbo-cavernoſi*, are fixed at one part to the anterior portion of the *Sphincter Ani*, paſs over the bulb of the Urethra, which they embrace almoſt every where, and continuing their courſe about three fingers breadth over that duct, they terminate on each ſide in the Corpora Cavernoſa. Theſe two muſcles are united with each other, almoſt in their whole extent, by an intermediate tendon.

The *Tranſverſe Muſcles*, called alſo *Triangular*, are each of them fixed by one of its extremities to the internal ſurface of the branch of the *Iſchium*, and running tranſverſly towards the Urethra, they terminate poſteriorly at the lateral parts of the eminence called the bulb of the Urethra, to dilate that duct when they act.

If we obſerve that men deprived of their teſticles are unfit for generation, we will eaſily conceive that the liquor furniſhed by theſe organs is a true Semen; and if there have been men who after loſing their teſticles have for ſome time had marks of virility,

they

they have not long enjoyed this advantage, for hardly have they once or twice given proofs of this kind, till they are very ſoon after out of a condition to give any more. This renders it highly probable, that theſe laſt marks of their antient virility, are the effects of a remainder of Semen, ſeparated by the teſticles, and preſerved in the *Veſiculæ Seminales.*

When we examine the Semen only by the aſſiſtance of our ſenſes, we find it under the form of a greyiſh liquor, and as it were aqueous in the teſticle, whiter and thicker in flowing from the *Epididymis*, ſtill whiter and thicker when diſcharged from the Penis, and of a pretty ſtrong ſmell.

All theſe different changes which probably tend only to render the Semen more proper for generation, proceed not only from the long and winding tracks thro' which it paſſes, but alſo on the mixture of the humours with which it meets in its way. The Semen in coming from the Teſticle enters the winding veſſels and foldings of the *Epididymis*, whence it paſſes into the *Vas Deferens*, which diſcharges it into the *Veſiculæ Seminales*, where it remains till it is in a due quantity, and ſufficiently active to make on the ſides of theſe Veſiculæ the impreſſions neceſſary to be expelled from them, and then it is conveyed into the Urethra by means of the ejaculatory veſſels. When the Semen is in the Urethra it is mixed with the liquors which it finds there, and which are furniſhed as well by the *Proſtatæ* as by the Lacunæ or blind ducts. The erection which accompanies the diſcharge of this liquor, has for its immediate cauſe the continuance of the blood in the *Corpora Cavernoſa* and in the ſpongeous texture of the Urethra, which happens by the compreſſion which the *Vena ipſius Penis* receives from the *Oſſa Pubis*, towards which the Penis is preſſed by the contraction of the *Muſculi Erectores*, and the

courſe of the Semen in the Urethra during ejaculation, not only by the action of the *Acceleratores*, but alſo by the inflation of the ſpongeous texture of the Urethra.

As the qualities which our ſenſes diſcover in the Semen are not ſufficient to make us perfectly acquainted with its nature, phyſicians have neglected nothing to diſcover what renders it capable of the ſurpriſing effects which it produces. I ſhall not here recite their different opinions, but only obſerve, that we ought to diſtinguiſh two parts in the Semen, the one groſs and the other ſubtile.

Our ſenſes convince us of the firſt, and the weakneſs which ſucceeds the loſs of a ſmall quantity of this liquor does not permit us to doubt of the laſt, I mean, that the Semen contains a great deal of ſpirits, or of thoſe ſubtile parts which contribute moſt to the ſtrength and activity of man. It is even probable, that it is principally on this ſecond part of the ſeminal matter that all the effects it produces in the body of a woman depend, as I ſhall afterwards ſhew.

CHAP. XI.

Of the Parts in Woman ſubſervient to Generation.

THE parts in women ſubſervient to generation are from their different ſituations diſtinguiſhed into external and internal; the latter are concealed in the lower belly, and the former are placed without that cavity.

ARTI-

ARTICLE I.

Of the external Parts.

THERE are ſeveral parts which preſent themſelves externally, and which we can ſee without any diviſion, namely, the groin, the *Mons Veneris*, the great lips, the entrance, the Furca, the Foſſa Navicularis, the Perinæum, the Nymphæ, the glans of the Clitores, the Meatus Urinarius, or orifice of the duct of the urine, and that of the Vagina.

The internal parts are the Vagina, the Uterus, with its veſſels and ligaments, the Fallopian tubes, and the Ovaries.

The Groin is that part of the Pubis which is covered with hair at the age of puberty.

The *Mons Veneris* is that eminence which is obſervable there, and which is formed by the fat in that part.

The great lips are two foldings formed by the ſkin, and the entrance is the ſpace which the great lips leave between them. The internal ſurface of theſe lips is ſmooth, even, and without hair. In them we obſerve ſeveral ſmall apertures or Lacunæ, which are only the orifices of ſome ſebacious glands concealed behind the membrane which covers this internal ſurface, and theſe glands conſtantly keep this ſurface ſmooth and even.

The *Furca* * is properly the union of the lips by their inferior part, where we obſerve a membranous ligament which is tenſe in girls, relax in thoſe who have ſuffered the embraces of a man, and almoſt always lacerated in thoſe who have borne children. This ligament, in conjunction with the internal part of the under ſide of the great lips, forms a depreſſion commonly called the *Foſſa Navicularis*. The *Perinæum* is the ſpace between the *Furca* and the

* Orifice of the Vagina or Os Uteri Externum.

Anus, and this ſpace is diminiſhed in thoſe who have borne many children, and even deſtroyed in women during labour. Its general extent is about an inch.

In ſeparating the great lips we diſcover other two ſmaller,, called the *Nymphæ*. Their ſubſtance is ſpongeous, and their figure triangular, being broader at their inferior than at their ſuperior part, where they unite, forming a kind of Prepuce or glans to the Clitoris.

The Clitoris is a body whoſe compoſition is entirely ſimilar to that of the Penis, there being no difference but with reſpect to the Urethra, which does not enter its compoſition; for it has two Corpora Cavernoſa entirely ſimilar, which come from each branch of the *Os Iſchium*, a ſuſpenſor ligament, veſſels, two erector muſcles, and ſome even aſcribe to it two accelerator muſcles; but as we obſerve that theſe laſt derive their origins from the *Sphincter Ani*, and that after embracing the ſides of the Vagina they terminate in the *Clitoris*, 'tis pretty evident that their true uſe is to ſhrivel the entrance of this duct. Some women have been ſeen in whom the Clitoris has been very long.

Immediately below the glans of the Clitoris we obſerve an aperture called the *Meatus Urinarius*. This is the orifice of the Urethra, which, as I have ſaid, is ſhorter, wider, and leſs crooked than that of men. The orifice ſeems to be a kind of purſe ſomewhat wrinkled, and we diſcover in it ſeveral ſmall holes or Lacunæ, which correſpond to a glandulous body which embraces the extremity of the Urethra, and from theſe holes we may expreſs a more or leſs mucilaginous humour. We afterwards perceive below the *Meatus Urinarius* the aperture of the duct called *Vagina*, which correſponds to the *Uterus*; ſome have called this the external orifice of the *Uterus*. We there obſerve a membranous circle

called the *Hymen*. This circle is only found in girls who have not permitted the entrance of any body capable of doing violence to theſe parts, for in women, in whom this circle is divided, we there find four or five fleſhy knots commonly called the *Carunculi Myrtiformes*, which are only portions of the divided circle.

Inſtead of this circle, or the Caruncles, we ſometimes find there a membrane which cloſes up this orifice. As this membrane is preternatural, we are obliged to divide it, in order to procure a diſcharge of the fluids which come from the Uterus or Vagina, the retention of which might produce terrible ſymptoms, and lay a foundation for conſiderable miſtakes. A girl was declared pregnant by the midwives, on account of an inflation and tenſion of the Uterus, produced by a conſiderable quantity of menſtrual blood retained by a ſimilar membrane; but this pretended pregnancy was ſoon diſſipated, when this membrane was cut and the retained blood diſcharged *.

Mr. *Boudon* † tells me, that by the ſame means he immediately cured a young lady of a pretended Scirrhus of the Uterus, for which ſhe had been under cure for a long time, and which aroſe from the ſame cauſe with the ſuppoſed pregnancy now mentioned.

The orifice of the Vagina is covered externally not only by the muſcles of the Clitoris, commonly called accelerators, but we alſo diſcover under theſe muſcles a net-work of ſanguiferous veſſels, which form a particular body called the *Plexus Retiformis*, under which we find on each ſide a conglomerate gland, whoſe excretory duct, which is about ſix

* See Paré Lib. 24. Chap. 50. and the Obſ. of Mr. *Amand* on *Deliveries*.

† Surgeon major of the Hotel-Dieu.

lines long, diſcharges itſelf on each ſide in the orifice of the Vagina, immediately at the anterior and middle part of the membranous circle which I have ſaid is found there. Theſe glands are like the inferior *Proſtatæ* of men, and the orifices of their excretory ducts are called *Lacunæ*.

ARTICLE II.

Of the internal Parts.

OF all the internal parts in women ſubſervient to generation, the moſt conſiderable is the Uterus. This is an organ peculiar to women, ſituated in the Hypogaſtrium, between the bladder and the Rectum. Its figure is nearly that of a pear, being flat in the anterior and poſterior parts. But this figure is changed, in geſtation, the Uterus being then almoſt round. Its broadeſt part is called its bottom, and its narroweſt part its neck. The ſituation of the Uterus is ſuch, that its bottom is backwards and upwards, and its neck forwards and below.

As for the dimenſions of the Uterus, we obſerve that in a woman who is not with child it is generally three or four fingers breadth in length, and about an inch in thickneſs. Its bottom is about three fingers breadth, and its neck only two. Theſe dimenſions may be changed, not only by geſtation, but alſo by ſeveral other circumſtances.

The ſubſtance of the Uterus is pretty firm in women who are not with child, but it loſes its firmneſs in proportion as geſtation advances; and in the laſt months we obſerve, that it is principally compoſed of a great number of ſanguiferous veſſels and fibres, moſt of which are fleſhy.

The cavity of the Uterus has three ſenſible apertures, one of which correſponds to its neck, and the other

other two to the Tubæ Fallopianæ, of which I ſhall afterwards ſpeak.

I ſhall here ſay nothing of the thickneſs of the ſides of the Uterus during the laſt months of geſtation, authors who have wrote on that ſubject being much divided in their ſentiments; for ſome think that this thickneſs is augmented in proportion to the capacity of the *Uterus*, and others maintain the contrary. There are two circumſtances which, without being ſufficient proofs to confirm the thinneſs of the Uterus in the laſt months of geſtation, before the evacuation of the waters and the excluſion of the Fœtus ſeem nevertheleſs pretty ſtrong preſumptions to engage us to be more raſh in our judgment in favour of the contrary opinion. The firſt of theſe circumſtances is the facility with which we diſtinguiſh the motions of the child in the laſt months of geſtation, by putting the hand on the mother's belly, or by touching the internal orifice of the Uterus. The ſecond is the laceration which ſometimes happens in the Uterus, whether by the fingers of the midwife or the too violent puſhing of the child's feet againſt the ſides of that organ*.

The neck of the Uterus is embraced by the extremity of the Vagina. This duct is ſituated a little obliquely from below upwards, between the bladder and the Rectum, and by one of its extremities communicates with the external parts, and by the other with the Uterus.

Its length is about five or ſix inches, and its breadth a large inch. But this duct being membranous, theſe dimenſions may be changed. It is compoſed of ſeveral membranes, the firſt of which is membranous; the ſecond is fleſhy, and compoſed of longitudinal and circular fibres; the third is

* See Obſ. de Mauriceau Obſ. 26, 147, 251. Fabric. Hildan. Obſ. Cent. 4. Obſ. 57. Stalp-Vander Wiel. Obſ. Cent. Obſ. 57.

nervous, and almoſt in its whole extent forms ſeveral foldings, which are more numerous in the anterior and poſterior part of the Vagina than in all the reſt of its extent. Theſe foldings are obliterated by a great number of births. The nervous coat is penetrated with a great number of holes, which correſpond to as many vaginal glands. The Vagina has frequently been torn in delivery, and eſpecially in the part where it is joined to the Uterus, by which means the child has been lodged in the lower belly. This dilaceration is leſs rare than that which I have ſaid happens to the Uterus*.

The neck of the Uterus advances a little into the Vagina, there forming the *Os Tincæ*, which reſembles the mouth of a tench. It is perforated with an oval aperture, whoſe angles go to the right and left, and this aperture is called the internal orifice of the Uterus. The neck of the Uterus is adherent before to the bladder, and behind to the Rectum.

The connexions of the bottom of the Uterus are with the Fallopian tubes and the ovaries, and with the Iliac regions, by means of two ligaments called *Ligamenta Lata*, and laſtly, with the region of the Pubis, by two others called the *Ligamenta Rotunda*.

Practice evinces that the Uterus ſometimes changes its natural ſituation, running to the right and to the left, forwards or backwards, which happens moſt commonly during geſtation, eſpecially towards its end. We may be aſſured of this change of ſituation by touching the internal orifice of the Uterus, for at that time we find it turned to the ſide oppoſite to that where its bottom lay†.

The Fallopian Tubes are two ducts which ariſe from the ſuperior and lateral parts of the bottom of

* See Obſervat. of Mr *Saviard*, Surgeon of *Paris*, Obſ. 25.
† See Deventer Obſ. on Deliveries.

the

the Uterus by a very ſlender beginning, and their bulk as well as their cavity is augmented in proportion as theſe ducts are diſtanc'd from the Uterus going to the ſides, ſo that in the place where they are moſt dilated we may introduce the extremity of the little finger. They afterwards ſhrivel up towards their extremity, leaving only a ſmall hole capable of receiving a probe, and at laſt are widen'd in order to form what we call the pavillion, whoſe circumference is not only plated, but alſo fringed and cut in the edges, and this is what we call the fringed portion. The length of theſe tubes is about ſeven or eight fingers breadth, and they are compoſed of ſeveral membranes as well as the Vagina. Theſe ducts are fixed in all their length to the Ligamenta Lata, and by their means to the ovaries, to which they are alſo united by a part of the fringed portion.

The Ovaries are two ſmall, whitiſh, oval, and little flat bodies, ſituated at the ſides of the Uterus, to which they adhere not only by the *Ligamenta Lata*, but alſo each of them by a kind of round ligament, which the ancients have looked upon as a kind of duct, which they have called *Ductus Deferens*.

In the ovaries we diſcover two membranes, the firſt is furniſhed by the *Ligamenta Lata*, the ſecond which is proper to them immediately covers their ſubſtance, which is formed of a ſpongeous and very compact texture; and of ſeveral ſmall veſicles full of a very clear liquor. Theſe veſicles are called eggs, and the ſpongeous texture ſeems to furniſh each of them with a kind of particular coat or Calyx. The whole is interſperſed with veſſels, both ſanguiferous and nervous.

The *Ligamenta Lata* of the Uterus are two foldings of the Peritonæum, which fix this organ to the Iliac regions, and which in ſpreading themſelves embrace

embrace not only its body, the Fallopian Tubes, and the Ovaries, but alſo the *Ligamenta Rotunda*. Theſe laſt ariſe from the ſuperior and lateral parts of the Uterus under the form of cords, and running obliquely from above downwards, paſs thro' the rings of the *Obliqui externi* to terminate at the region of the Pubis, and at the ſuperior part of the thighs, by ſeveral filaments. It has been obſerved, that theſe ligaments are principally compoſed of an aſſemblage of ſeveral veſſels, moſt of which are ſanguiferous, and eſtabliſh a communication between the veſſels of the internal and thoſe of the external parts.

The Uterus receives its nerves from each ſide of the intercoſtal, and the Par Sacrum alſo furniſhes it with ſome ramifications. Its arteries come from the Aorta and internal Iliacs. The arteries ſent to it from the Aorta are called ſpermatic, they generally ariſe below the emulgent, and running obliquely to the Ovaries are there diſtributed, as well as to the Uterus and the Fallopian Tubes.

The arteries which the internal Iliac furniſhes to the Uterus, are more numerous than thoſe ſent to it from the Aorta; and we obſerve that theſe arteries called uterine are principally diſtributed to the body of the Uterus, and that they communicate not only with thoſe on the oppoſite ſide, that is, with thoſe of the left ſide, but alſo with the ſpermatics.

The veins follow the courſe of the arteries. Thoſe which follow the courſe of the ſpermatics bear the ſame name, and in aſcending form a pampiniform body as well as thoſe in men, and alſo diſcharge themſelves in the ſame manner, that is to ſay, that on the right ſide into the trunk of the Vena Cava, and that on the left ſide into the Emulgent. As for the veins which accompany the uterine arteries furniſhed by the internal Iliacs, they diſcharge

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themſelves into the Iliac veins; and the communication of all theſe veins with each other, is the ſame with that which I have ſaid ſubſiſts between the arteries.

As for the lymphatic veins of the Uterus which we have been ſo long in diſcovering, Mr. *Morgagni*, a celebrated Anatomiſt, ſays, he lately ſaw them in a woman who died in geſtation. In the Uterus we alſo find lacteal ducts, when geſtation is far advanced.

The Uterus is concave, and its cavity correſponds to its bulk. We ought to diſtinguiſh the cavity of the bottom of the Uterus, from that of its neck, tho' both are continuous and communicate with each other, that of the neck is long and narrower at its extremities than in its middle. Its entrance is obſervable in the Vagina, and is call'd the internal orifice of the Uterus. In this cavity we find ſeveral foldings or corrugations form'd by the membrane which lines it, in which we diſcover ſeveral ſmall holes or lacunæ which furniſh a mucilaginous humour. We alſo ſometimes find among theſe foldings, ſmall ſpherical bodies whoſe nature is not agreed upon. *Naboth* has taken them for eggs.

The cavity of the bottom of the Uterus is much larger than that of its neck. This cavity is of a triangular figure, which is principally obſerved when the bulk of the Uterus has ſuffered no change. Of the three angles of this cavity there is but one which correſponds to the neck of the Uterus, and the two others correſpond to the Fallopian Tubes, which communicate in this cavity by very ſmall apertures. The membrane which lines this cavity is pierced with a great number of ſmall holes, thro' which, by the leaſt preſſure, the blood is diſcharg'd; which has made theſe orifices to be look'd upon as the way, by which the Menſes are diſcharg'd.

Mr.

Mr. *Ruyſch*, a celebrated Anatomiſt, ſays, he has diſcover'd in the bottom of the Uterus a muſcle compoſed of fleſhy fibres, moſt of which are circular and ſome ſpinal. He calls this the uterine muſcle, and ſays, that its uſe is to facilitate the ſeparation of the Placenta after the expulſion of the Fœtus. This diſcovery is not much received, becauſe ſome ſkilful Anatomiſts doubt of the exiſtence of ſuch a muſcle.

Mr. *Littre*, in diſſecting a girl of two months old, found that ſhe had the Vagina divided by a fleſhy perpendicular partition into two equal cavities, one to the right, and the other to the left, in ſuch a manner however that the partition was not entire, and only form'd theſe two cavities from the middle of the Vagina to the Uterus. Each of theſe cavities ended in a particular Uterus which had its orifice, its neck, and its bottom. Theſe Uteruſes which were diſtinct and ſeparate internally, had externally but one ſimple and continued body, except their bottoms which where ſeparated, or rather fixed to each other, only by a membranous ligament in form of a triangle. Each bottom terminated in a point, and had a Tube. There was alſo an Ovary, a *Ligamentum Latum* and a *Ligamentum Rotundum*. Mr. *Littre* preſumes, that if this girl had lived and been married, ſhe might have conceived by different embraces, ſometimes in one of the parts of her Uterus, and ſometimes in another, according as the ſemen happen'd to enter the one or the other *.

If it ſhould be aſk'd whether if the body of the Uterus was fallen out and its reduction found impaſſible, it ſhould appear diſpoſed to a gangrene, it would be proper to extirpate it after the application of a ligature as high as poſſible? I anſwer,

* See Memoirs of the Royal Academy of Sciences, 1705, and *Joan. Schenck*, Obſ. *Lib.* 4. *De utero.*

that

that in ſuch a caſe we ought not to heſitate to perform the operation, in order to hinder the gangrene from ſpreading to the internal parts, which would prove mortal to the patient. The extirpation of the Uterus, tho' a rare operation would not be raſh on this occaſion, its ſucceſs being proved by many obſervations. Mr. *Vieuſſons*, a celebrated phyſician of *Montpelier* ſo well known for his Neurography, relates in his treatiſe of the Humours, that a bleacher woman of thirty years of age, and of a very ſtrong conſtitution, after ſeveral very conſiderable efforts was afflicted with a deſcent of the Uterus which fell thro' the Pudendum, under the form of a round reddiſh tumor, almoſt as large as two fiſts. Mr. *Vieuſſons* thought that it was the body of the Uterus which was revers'd. This tumor not being capable of reduction, it was reſolved to extirpate it, which was done after the application of a ligature, and the patient was cured. But ſix years after the operation, the patient dying, the body was open'd, and Mr. *Vieuſſons* was convinced of the juſtneſs of his conjectures, in thinking that it was the inverted Uterus which form'd the tumor which had been remov'd; for it was found that the wound in the Uterus was perfectly cicatriſed, and that there had only remained in the body a ſmall portion of the neck of that organ, which was very hard and callous.

Ambroſe Paré alſo relates, that being call'd to ſee a woman who, after conſiderable vomitings and violent efforts, had felt between her thighs a weighty body which incommoded her, he diſcover'd that it was a fleſhy body which hung out of the Pudendum. The reduction of this extraneous body was in vain attempted, and as it began to grow gangrenous, *Paré* determin'd to extirpate it in preſence of ſeveral Phyſicians and Surgeons. This fleſhy maſs being afterwards examin'd, it was thought to

be the Uterus accompanied with one of the Ovaries, and this conjecture was ſoon confirm'd; for three months after, this woman dying of a pleuriſy, the aperture of her body evinced that it was her Uterus which had been cut off *.

Rouſſetus, in his treatiſe *De Partu Cæſareo*, ſays, that a woman after many laborious births had a falling down of the Uterus, which not being capable of reduction became gangrenous and fell off of its own accord. The woman did not keep her bed and enjoyed a perfect ſtate of health for three years, at the end of which, dying of a continual fever, the aperture of her body evinced that it was the body of the Uterus which by putrefaction had fallen off.

Generation is prepared by the union of the two ſexes, and perfected by the action of the ſemen, then tranſmitted into the organs of the woman. But beſides the erection of the Penis during this union, which is accompanied with the ejaculation of the ſemen, the intromiſſion of this part into the vagina, ſeems alſo neceſſary. However 'tis certain from experience that women have conceived in whom ſuch an intromiſſion was abſolutely impoſſible.

The operation of generation is one of the moſt impenetrable myſteries of phyſic. Thus we find that there is no queſtion about which philoſophers are more divided. I ſhall however only relate the two opinions moſt generally received.

The firſt aſſerts that man and all animals, *viviparous* as well as *oviparous*, derive their origins from an egg; and that in the ſame manner, as in an impregnated hen's egg, all the parts which ought to compoſe the pullet are there form'd in miniature;

* See *Paré*, Lib. 34. Chap. 48. *Joan. Schenck.* Obſ. Lib. 4. *De uteri Ectomia zacut. Luſitan. prax. med. ob.* 76. *Michael Albert tentam. lexici Realis*, Obſ. Med.

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ſo alſo in the ſmall eggs of the ovary of a woman, and other viviparous animals, all the parts which ought to compoſe the fœtus are found in embryo †.

The partiſans of the ſecond opinion do not agree that this combination of all the parts of the animal is found in the egg before it is fecundated by the ſeminal ſpirit. They think that it is conveyed thither with the ſemen. That the former conſider the ſemen of the male, as a matter proper to unfold the parts of the offspring contained in the egg, both of viviparous and oviparous animals. The latter look upon the ſmall eggs contained in the Ovaries, as ſo many ſmall neſts proper to receive the animals which they affirm are found in the male ſemen, and which, according to them, may be ſeen by the aſſiſtance of a good microſcope in a drop of prolific ſemen while warm.

In both theſe opinions 'tis granted, that the egg which has been fecundated in the approaches of the male and female, is detach'd from the Ovary by the action of the ſpongious texture which embraces each egg in particular, almoſt in the ſame manner as an acorn is included in its calyx. The diviſion which then happens in that portion of the membrane of the Ovary, which correſponds to the fecundated egg, permits it to be entirely detach'd, and to enter into the arch of the tube which is applied over the Ovary, and the egg continuing its courſe into the cavity of this duct, falls into the Uterus.

† *Viviparous* animals are thoſe which preſerve their offspring pretty long in the Uterus to diſplay all their parts, ſo that they bring forth living animals; for which reaſon they are call'd viviparous.

Oviparous animals are thoſe which throw out their offspring which time and heat perfect; and this offspring, with its nouriſhment and coverings, is call'd an egg.

The moſt generally received opinion concerning the road which theſe ſmall ſeminary animals or ſeminal ſpirits take to arrive at the Ovary, is that being tranſmitted into the Uterus during ejaculation; they inſinuate themſelves into one of the Fallopian Tubes or into both, which being then in a kind of contraction, their arch is applied over the Ovary which it embraces. Whence it happens that theſe animals, or the ſeminal ſpirits arriving in the Ovary, penetrate the egg moſt diſpoſed to receive them.

There are ſome phyſicians think that theſe ſeminary animals, or ſeminal ſpirits, are tranſmitted to the Ovary by the way of the circulation.

Fecundated eggs have been found to remain in the Ovary and there unfold themſelves: Others, being detach'd from it have fallen into the belly, and others having gone into the tube have remained in it.

Mr. *Littre* has preſented to the Academy of Sciences, an obſervation on a fecundated egg which was unfolded in the Ovary; the ſmall embryo obſerved there was a line and a half thick and about three long, and floated in a clear and mucilaginous liquor. He ſays he alſo obſerved, without a microſcope, the umbilical cord which fixed that *Fœtus* to the membranes of the egg, its head, the aperture of the mouth, a ſmall eminence in the part of the noſe, and laſtly the trunk, which terminated at its inferior part by two ſmall ſtumps *.

Several authors relate hiſtories of Fœtuſes fallen into the belly without any leſion of the Uterus or the Tubes. Mr. *Courtial* §, a phyſician of *Toulouſe*, ſays he ſaw a Fœtus in the belly with its cord round its neck, and whoſe placenta, which was ſituated un-

* See Memoirs of the Royal Academy of Sciences, 1701.

§ See Mr. *Courtial* Sur les os. *T. Bartholin*, Hiſt. Anat. Cant. 6. Hiſt. 92. Miſcell. medico phyſic, Obſ. 110.

der

der the ſtomach, communicated with the gaſtro Epiploic veſſels.

We have alſo various obſervations of Fœtuſes found in the Fallopian Tubes. Mr. *Littre* ‖ has preſented the Academy of Sciences with the hiſtory of a Fœtus found in the left tube. And *Riolanus* * mentions one found in the right.

To theſe obſervations I ſhall add ſome other caſes no leſs conſiderable for their ſingularity. The firſt mentioned by *Dionis* in his Anatomy relates to a woman of *Toulouſe*, in whoſe belly was found a Fœtus included in a ſhapeleſs maſs, in which it was thought to have remained twenty-five years. This Fœtus, which weighed eight pounds, was half petrified. Mr. *Dionis* mentions another ſingular caſe to which he was witneſs, and which alſo relates to a Fœtus found in the belly. This Fœtus which was about five or ſix months old, had during that time remained in a bag, which was joined to the body of the Uterus, and of which it appear'd to be a portion, having a particular Tube, an Ovary, a *Ligamentum Latum* and a *Ligamentum Rotundum*. But being carefully examin'd it was found that its cavity had no communication with that of the Uterus, and that it was only united to it by ſome veſſels covered with membranes. This bag burſting left the Fœtus to fall into the belly and the mother died.

The third is the caſe of a woman about thirty years of age, who diſcharged by ſtool ſeveral bones of a Fœtus about ſix years old: Mr. *Littre*, who took care of the patient, finding that the Uterus was in its natural ſtate, and being informed that nothing was brought from it during geſtation, con-

‖ See Memoirs of the Royal Academy of Sciences, 1702.

* *Riolan. Anthropograph.* Lib. 2. Chap. 35. Act. Erud. Lipſ. 1701. Febr.

veyed his finger into the Rectum, the ſide of which he found perforated with a hole about an inch and a half in extent, and thro' which he touched the bones of the head, which determined him to lay hold of theſe bones with the cutting Forceps, to diminiſh their bulk by cutting them. By this means he extracted them, and by continuing his care he delivered the patient from the deplorable ſtate ſhe was in, and reſtored her to perfect health which ſhe enjoyed ſeveral years †.

Mr. *Littre* thinks that the child had been included in a bag about three lines thick, which he concluded from the ſhreds of it which came away with the bones; and he preſumes that it was form'd by the membranes of the Tube or Ovary, where the Fœtus had ſtopt and grown, but that not being able to yield ſufficiently, they had burſt and permitted the Fœtus to fall into the Hypogaſtrum, where, wanting nouriſhment, it had died and corrupted by its continuance, which had been the cauſe of the ſeparation of its bones; and the alteration of its body had produced the aperture of its Rectum, thro' which theſe bones afterwards came by ſtool *.

CHAP. XII.

Of the Fœtus and its Membranes.

THE egg having deſcended into the Uterus, its parts are unfolded, by which means not only the Fœtus but alſo the Placenta, the umbilical cord, and the membranes which contain the waters in which the Fœtus ſwim are produced.

† See Memoirs of the Royal Academy of Sciences, *An.* 1702. And Obſ. of Mr. *Amiand* on Deliveries at *Paris*, 1715.

* See *T. Bartholin.* De inſolitis partus humani.

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The Placenta or after-birth is a ſpongious and cellular body, compoſed principally of the interlacement of a prodigious number of blood-veſſels. It is adherent to the internal ſurface of the Uterus, and moſt frequently near the orifice of the Tube thro' which the fecundated egg deſcends into the Uterus.

The figure of the Placenta is orbicular and has two ſurfaces; that by which it touches the Uterus is ſomewhat convex and flat. Its bulk and thickneſs vary according to the diſpoſition of the body of the Fœtus, and the time of geſtation. It is obſerved that in the laſt months, the Placenta is about eight fingers-breadth broad, and about an inch thick in the middle, which diminiſhes inſenſibly in approaching to the circumference. When there are two or three Fœtuſes in the Uterus, there are generally as many Placentas, but in this caſe we obſerve that their circumference is not round as when there is only one, and that the different Placentas are united with each other, without any communication of their veſſels.

On the ſurface of the Placenta we obſerve a great number of arteries and veins. Theſe laſt by their union form a pretty conſiderable trunk, call'd the umbilical vein; and the arteries re-unite into two principal trunks which are alſo call'd umbilical arteries. Theſe three veſſels united by means of a cellular texture, and cover'd with a membrane continuous to thoſe which include the Fœtus, form the umbilical cord, which is about half an ell long. The umbilical vein runs in a ſpiral all along the arteries. Theſe three veſſels penetrate the lower belly of the Fœtus thro' the umbilical ring. The vein reaches the liver, and paſſing thro' its ſciſſure, diſcharges itſelf into the ſinus of the *Vena portæ*; and from the ſame ſinus, almoſt oppoſite to the inſertion of the umbilical vein, ariſes a particular duct call'd the Venous Duct, which diſcharges itſelf in

the trunk of the Vena Cava immediately under the Diaphragm. We obſerve in the partition of the auricles of the Heart, which is form'd by the union of theſe two fleſhy ſacks, an oval aperture, at the edge of which we find a membrane which adheres near the left auricle, to about two thirds of the circumference of this aperture, its ſuperior part being free. The manner in which this membrane adheres, has made it looked upon by ſome as a kind of Valve, which they have call'd the Valve of the Foramen Ovale; and they have ſuppoſed it proper to permit the blood to paſs from the right to the left Auricle, and capable of hindering its return from the latter to the former.

We alſo obſerve, that the pulmonary artery which ariſes from the right Ventricle of the Heart to be diſtributed to the Lungs, is divided into three branches, of which only two go to the Lungs, and the third, call'd the Arterial Canal, diſcharges itſelf in the beginning of the Aorta inferior. As for the Arteries, which enter the compoſition of the Cord, we obſerve that after having paſſed thro' the umbilical ring, they reach the lateral parts of the bladder, to which they furniſh ſome branches, and at laſt terminate in the internal *Iliac* Arteries. But if we advert to the courſe of the liquor contained in theſe three veſſels, we will be convinced that the umbilical Vein derives its origin from the Placenta and the internal *Iliac* Arteries.

In the umbilical Cord of ſeveral animals we obſerve a fourth veſſel call'd the *Uracus*, which derives its origin from the bottom of the bladder, paſſes thro' the umbilical ring, continues along the cord, and terminates in a membrane call'd the *Alantois*, into which it diſcharges the urine, which it has received from the bladder. The *Uracus*, in a human Fœtus, has generally but one cavity, and only appears to extend from the bottom of the bladder to the navel.

The *Uracus* has been found open in ſome human Fœtuſes. Mr. *Littre* has given us two inſtances of this in two children. He alſo ſays, he found the allantoid or urinary membrane in the ſame ſubjects, which made him ſuſpect that this membrane is found oftner than is imagin'd, and perhaps always. He has alſo given two obſervations concerning two men, the necks of whoſe bladders being obſtructed, the urine was diſcharged from the navel †.

The membranes which include the Fœtus are call'd *Chorion* and *Amnion*. The firſt is the outermoſt, and is applied immediately to all the internal ſurface of the Uterus. It is a ſpongious membrane, moderately thick, and moiſten'd by ſeveral blood-veſſels. It furniſhes a very fine Lamina, which covers that ſurface of the Placenta which touches the Uterus. This Lamina is perforated with a great number of ſmall holes for the paſſage of the veſſels of the Placenta, for which reaſon it is by ſome call'd *Lamina reticularis*.

The ſecond membrane, call'd the *Amnion*, is tranſparent and much thinner than the *Chorion*. It is moiſten'd by none, or at leaſt very few blood-veſſels. It terminates in the Cord, and contains with the *Fœtus*, a liquor in which it ſwims and performs its motions. There is a third membrane placed between the *Chorion* and the *Amnion* which covers the plain ſurface of the Placenta, and the Cord furniſhing ſheaths to the branches of the umbilical veſſels in the Placenta *.

Thus when the Fœtus is at its full term, the Placenta being ſmaller in proportion than the Fœtus, it is the more eaſily diſcharg'd after it. Hence it is

† See Memoirs of the Royal Academy of Sciences, 1701.

* See *Rouhault* Memoirs of the Academy of Sciences, 1714, 1716, 1718. *Hobokenus* De anat. ſecund. human. Diemerbroec k. Anat. Lib. 1. Cap. 31. And *Needham* Obſ. Anat.

that deliveries before the time, tho' more eaſy on account of the ſmallneſs of the Fœtus, are never the leſs more dangerous; for tho' the Fœtus may have made a paſſage ſufficient for itſelf, yet that paſſage may be too ſmall for the Placenta which ought to follow it *.

ARTICLE I.

Of the Nouriſhment of the Fœtus.

'TIS probable that at firſt the *Fœtus*, or rather the *Embryo*, for ſo it is call'd in the beginning, is only nouriſhed by a kind of oozing of the liquor in which it floats, thro' the pores of its body; for the ſmall veſicle or egg which has been fecundated comprehends three things. I mean its membranes, the liquor, and the prolific matter which it contains; and in preſerving the form of a veſicle, it is ſeparated from the Ovary and received into the Tube in order to paſs into the *Uterus*. It is even probable, that the Placenta is at firſt only form'd of the ſmall veſſels which fix'd the egg to the Ovary, and which remaining on its membranes, have been unfolded and lengthen'd.

When the parts of the Fœtus are unfolded and grown to a certain degree, it is nouriſh'd by the umbilical Vein; and laſtly, when the Mouth, the Œſophagus, Stomach and Inteſtines are entirely form'd, it is not only nouriſh'd by the umbilical Vein, but alſo by the Mouth, with the humour in which it ſwims, and which is contain'd in the *Amnion*.

The uterine arteries of the mother depoſit the nutritive juices neceſſary for the Fœtus in the veſicles of the Placenta. We may add, that the

§ See Memoirs of the Royal Academy of Sciences, 1701.

lacteal veſſels, diſcovered in the Uterus during the latter part of geſtation, alſo furniſh a part of theſe nutritive juices. Theſe liquors are received into the ramifications of the umbilical Vein, which tranſmits them into the ſinus of the *Vena Portæ*, where mixing with the blood there, they paſs thro' the venous duct to be diſcharg'd into the Vena Cava inferior; and laſtly, into the right Auricle of the Heart, where they are alſo mixed with the blood there; and the contraction of this Auricle forces them partly into the right Ventricle, and partly into the left Auricle, thro' the *Foramen Ovale*. The blood which has enter'd the right Ventricle, being forced out of it by its contraction, paſſes thro' the pulmonary Artery which correſponds to that Ventricle, and there the blood is divided, that is to ſay, one part of it paſſes into the Aorta inferior, by means of the arterial Canal, while the other part, which is leſs conſiderable, goes to the Lungs.

The portion of the blood, which I have ſaid paſſes into the left Auricle by means of the Foramen Ovale, mixes in that Auricle with the portion of blood which returns from the Lungs, the pulmonary Vein, and theſe two portions of blood afterwards paſs into the left Ventricle, which by its contraction forces them to enter into the Aorta, and to flow thro' its different ramifications.

According to this opinion the Valve of the *Foramen Ovale* hinders the blood from paſſing from the left into the right Auricle.

Mr. *Mery*, a celebrated ſurgeon at *Paris*, has maintained a contrary opinion to that which I have laid down. He thinks that the blood paſſes in as great a quantity to the Lungs, as if the Fœtus reſpired. He founds this opinion on the conſiderable diameter of the pulmonary artery of the Fœtus, and thinks that the blood which returns into the left Auricle, enters partly into the Ventricle on the ſame ſide,

while the other portion paſſes thro' the *Foramen Ovale* to diſcharge itſelf into the right Auricle *.

Mr. *Winſlow* † conſiders the two Auricles of the Heart of the *Fœtus* as only forming one with reſpect to the *Foramen Ovale*, and the two Ventricles as one with reſpect to the arterial Canal; and laſtly, the Lungs of the Fœtus with reſpect to the circulation of the blood, as another organ whoſe uſe is unknown. This being granted, it appears very natural to him, to think that the blood which returns by the Vena Cava into the right Auricle, without any impetuoſity, meets with that which returns from the Lungs in the left Auricle; that they mix in the diaſtole of the Auricles, and by that means they become an uniform liquor, and equally impregnated with that which the Placenta has furniſh'd; that this liquor, thus mixed, is divided in the diaſtole of the Auricles, to be propelled thro' the two Ventricles as thro' one, and to be equally diſtributed thro' the pulmonary Artery, the arterial Canal, and the Aorta, as thro' one ſingle arterial Trunk, to all the parts in general. He aſcribes no other uſe to the Valve of the Foramen Ovale, than to form an entire partition, after delivery, between the two Auricles, which ſhut up the paſſage of the one to the other.

At the beginning of the Vena Cava inferior, we find a Valve call'd the Valve of *Euſtachius*. It is moſt frequently membranous, and ſometimes diſpoſed like net work. Its figure is nearly that of a creſcent; the convex edge is turn'd downwards, and adheres internally to the anterior ſides of the Vena Cava inferior; and of the two horns of the creſcent, one terminates anteriorly in the edge of the Foramen

* See Memoirs of the Royal Academy of Sciences, 1699, 1701.

† See Memoirs of the Royal Academy of Sciences, 1717, 1725.

Ovale,

Ovacle, and to the portion next to the Auricles, and the other adheres to the poſterior edge of the ſame Foramen, and alſo to the portion next to the Auricle, ſo that being arched, that is to ſay, ſeparated from the ſides of the Vena Cava, it is applied over the partition of the Auricles near the baſe of the heart. As this valve is generally more extended in proportion in a Fœtus than in adults, Mr. *Winſlow* thinks that it hinders the blood of the Auricles from regurgitating into the Vena Cava inferior, whence it might alſo regurgitate into the umbilical vein, if it has no valve capable of oppoſing it*.

As the fœtus does not reſpire during the whole time it is included in the membranes, it has need to receive by the umbilical vein new juices which have been penetrated by the air, and at the ſame time animated by the nutritive juices of the mother.

But it is evident, that this quantity of liquor continually furniſhed by the umbilical vein would not have failed to overload the fœtus, if it had not been freed from this ſuperfluity by the umbilical arteries which run to the Placenta to diſcharge themſelves in it.

There are two opinions concerning the ramifications of the umbilical arteries; ſome think that theſe veſſels form Anaſtomoſes with the ramifications of the umbilical vein; others pretend that they do not terminate in the Placenta, but that having paſſed thro' it they loſe themſelves in the ſpongious ſubſtance of the Uterus, there to diſcharge the blood which they bring from the fœtus, which being reſorb'd by the uterine veins, by that means eſtabliſh a communication between the child and the mother,

* See memoirs of the royal acad. of ſciences, 1708. and a treatiſe of the Fœtus, by Mr. *Tauvry*.

in

in the ſame manner as the umbilical vein eſtabliſhes one between the mother and the child. Among the various facts related to prove this opinion, Mr. *Mery*, who is one of its moſt zealous partizans, advances the following: A pregnant woman, ſays he, who was near her time, was quickly killed by a very ſevere fall. Seven pints of blood were found in the cavity of the Abdomen, and all her blood veſſels were entirely empty. The child was dead, but without any wound, and all its veſſels were empty of blood as well as thoſe of her mother. The body of the Placenta was ſtill adherent to the internal ſurface of the Uterus, in which there was no extravaſated blood. By what paſſage could all the blood of the child be diſcharged into the cavity of the mother's Abdomen? It muſt neceſſarily have been thro' the veins of the Uterus, and conſequently the veins carry the blood from the infant back to the mother, which alone ſeems to eſtabliſh the neceſſity of a communication between the infant and the mother. In a word, if this communication was not reciprocal, and was only from the Fœtus to the Placenta by the umbilical arteries, and not alſo to the mother by theſe ſame veſſels, this child who died in the Uterus would have ſtill had all its blood, tho' the mother had loſt hers *.

Mr. *Heiſter*, in the third edition of his Compendium of Anatomy, gives an obſervation which is almoſt the ſame with that which I have related. Mr. *Cowper*, a celebrated *Engliſh* anatomiſt, aſſures us, that having injected quickſilver into the umbilical arteries of the cord, it penetrated into the uterine veins of the mother. There are many other obſervations communicated by Mr. *Mery*, which tend to prove the truth of this opinion.

* See memoirs of the royal academy of ſciences, 1708.

The

The partizans of the contrary opinion affirm, that the mother furniſhes no blood to the infant but only a lacteal juice, which according to them is ſecreted by the glands, which they ſay are found in the internal ſurface of the Uterus, and which is reſorbed by the ramifications of the umbilical vein. They affirm, that there is no communication between the infant and the mother, which they imagine to prove by the fact which I ſhall now relate, and which ſeems to be the moſt advantageous for their opinion.

If we take a bitch ready to litter, bleed her till her veſſels are emptied as much as poſſible, and afterwards open her, we will find her puppies not only full of blood but alſo alive, even tho' we open the bitch half an hour after her death. It is certain, that this fact is contrary to that related by Mr. *Mery*; thus we have experiment againſt experiment. But Mr. *Mery* pretends, that theſe two experiments would agree if we did not open the bitch till the puppies were dead, and that in this caſe we would find them deſtitute of blood, which has happened to thoſe on which the experiment has been made in this manner.

As for the glands of the Uterus, Mr. *Mery* and ſeveral other Anatomiſts deny their exiſtence, having taken all poſſible pains to diſcover them, and to prove, that the mother really furniſhes blood to the Fœtus, and not ſimply a lacteal juice, he makes the following obſervation: Is it not evident, ſays he, that if after the expulſion of the Fœtus we cut the cord without tying it, and leave the Placenta adherent to the Uterus, the blood of the mother flows from the umbilical vein, and that of the child from the umbilical arteries? Does not this ſeem an inconteſtable proof, that the blood of the mother paſſes into the Fœtus thro' the umbilical vein? for it cannot be ſaid that the umbilical arteries can convey the

the blood of the infant into the Placenta when the cord is cut, nor that the Placenta furniſhes all the blood diſcharged from thoſe women in whom no ligature has been made on the portion of the cord adhering to the Placenta, ſince we can hardly expreſs a porringer full from it when ſeparated from the Uterus.

'Tis to be obſerved, that in ſaying with the partizans of the ſecond opinion concerning the reciprocal circulation between the mother and the child, that the arteries of the mother communicate with the umbilical vein, and that the umbilical arteries of the Fœtus communicate with the veins of the mother, I have not pretended to inſinuate that theſe communications were immediate, that is to ſay, that theſe veſſels were united with each other, but only that the arteries of the mother open into the cellules or pores of the Placenta, in which the orifices of the umbilical veſſels abſorb the blood, afterwards to tranſmit it to the trunk of that vein; and that the umbilical arteries open into the pores of the Uterus, where the orifices of the ramifications of the uterine veins of the mother receive the blood which theſe arteries carry thither, to diſcharge it afterwards into the trunk of the Hypogaſtrics. We ought not therefore to be ſurprized, if when during geſtation the Placenta is ſeparated, either in whole or in part, there ſhould be a flooding, and that it ſhould ſubſiſt till the mother is delivered both of Fœtus and Placenta, which permits the Uterus to contract and cloſe up the orifices of the veſſels which correſpond to the Placenta. With this view, when the flooding is conſiderable we try to deliver the woman at any period of her geſtation.

The adheſion of the Placenta to the Uterus is not then formed by the immediate union of the veſſels of the mother with thoſe of the *Fœtus*, for it only ſeems to depend principally on the inequalities of the

the ſurface of the Uterus and of that of the Placenta, received reciprocally into the ſmall cavities found between theſe eminences, and from which they are obliged to flow, when the Uterus comes to be contracted after delivery.

It is commonly thought, that the Fœtus is nouriſhed only by the juices with which the umbilical veins furniſh it. When the organs of digeſtion are ſufficiently unfolded to perform their function, it receives a ſecond nouriſhment by the mouth, and it is the liquor of the *Amnion* in which it ſwims that it ſwallows, which is evident, upon comparing this liquor with that in the ſtomach of the Fœtus. The black humour found in its large inteſtine, and which is called the *Meconium*, is probably no more than the groſſer part of this liquor ſeparated from it, after the alterations it has undergone in the ſtomach and ſmall inteſtines, and after having furniſhed the lacteal veins with its pureſt parts.

They who deny this ſecond nouriſhment found their opinion on this, that the Fœtus not reſpiring in the Uterus, cannot ſwallow. Mr. *Petit*, a celebrated ſurgeon, read to the academy of ſciences a memoir in which he proves, that the Fœtus can ſuck and ſwallow a liquor without the aſſiſtance of reſpiration. He compares the mouth to a pump, of which the tongue is the ſucker. 'Tis true, there have been Fœtuſes in which we are obliged to confeſs that this nouriſhment by the mouth was not poſſible, ſince they had no aperture either at the part of the mouth, or that of the noſe. Mr. *Gregory** told me, that he ſaw a human Fœtus in the condition I have mentioned†; and at St. *Come* I ſhewed the ſame caſe in a puppy juſt brought into the world. But if the example of this human

* A celebrated ſurgeon and man-midwife.

† See memoirs of the royal academy of ſciences, 1701. Hiſt.

Fœtus and of the puppy proves that they could not receive nouriſhment either by the mouth or noſe, and that the nutriment afforded them by the umbilical cord was ſufficient for their nouriſhment, yet we cannot conclude from theſe two obſervations, and others of a ſimilar nature, that the Fœtus is never nouriſhed by the mouth; for was it only in the caſe where there is no umbilical cord, as ſome authors aſſure us §, are we not obliged to grant that this nouriſhment muſt then take place, ſince without it the Fœtuſes could not have obtained the bulk at which they have arrived. Now if we cannot deny that the Fœtus is ſometimes nouriſhed by the mouth, I ſee no reaſon why we ſhould not believe that this ſecond nouriſhment is as natural as that which it receives from the umbilical cord; for in my opinion we have no more reaſon to conclude that this ſecond nouriſhment does not take place, becauſe there have been ſubjects without mouths and noſtrils, than to infer that the umbilical cord is not the ordinary way in which the Fœtus is nouriſhed, becauſe ſome ſubjects have been found in which it is wanting. Beſides, without reciting the reaſons generally advanced for the ſupport of this opinion, I ſhall only relate two obſervations which ſeem to be convincing. *Diemerbroeck* ‖ relates, that one of his daughters ſoon after her birth, before ſhe had ſucked or even ſwallowed any thing, vomited a large quantity of milk. The ſecond obſervation relates to the Fœtus of a cow: Mr. *Heiſter* * ſays, that he found in the ſtomach, Œſophagus, and mouth of this animal, a congealed liquor, which was continu-

§ Act. nat. Curioſ. Dec. 2 Ann. 7. Obſ. 209. Stalp. Vander Wiel Obſerv. Cent. 11. Obſerv. 32. Journal des Scavans, Ann. 1687. Pag. 333.

‖ Anat. Lib. 1. Cap. 32.

* See Heiſt. compend. anatom. 37.

ous to that of the *Amnios*, and of the ſame nature.

There is reaſon to believe that the liquor contained in the *Amnios* is ſeparated in the membranes of the Fœtus. But beſides that it ſerves for its nouriſhment, we may ſay that it is of great uſe to it during the whole of its continuance in the Uterus; for it not only permits it to move freely, but alſo ſcreens it, or at leaſt renders it leſs ſuſceptible of the impreſſions it might receive both from without and from the Uterus. Laſtly, this liquor ſerves to facilitate the paſſage of the Fœtus in the time of delivery, by lubricating the parts. Its diſcharge from the Uterus generally indicates an approaching birth, and 'tis commonly ſaid, that a woman has evacuated her waters when this diſcharge is made.

We ought to diſtinguiſh between this liquor and that which a woman ſometimes diſcharges in the latter end of her geſtation, this laſt being probably collected between the membranes of the Fœtus, and when this happens a woman is commonly ſaid to have evacuated her falſe waters.

I have before ſaid that the umbilical cord is about half an ell long. This length is neceſſary, to permit the Fœtus to move in the Uterus without any vellication of the Placenta, which would neceſſarily be ſucceeded by its total or partial ſeparation from the Uterus, and this ſeparation is always fatal, on account of the Hemorrhage which ſucceeds it, as I have before obſerved. This length of the cord is alſo advantageous after the excluſion of the Fœtus, ſince the midwife makes uſe of it to ſeparate the Placenta when it is not diſengaged of itſelf, or rather by the action of the Uterus.

However different or perhaps uncertain the ſituation of the Fœtus is in the Uterus, yet ſeveral authors think that at firſt this ſituation is ſuch that all the parts of its body are folded, and form a round

figure

figure almoſt like a bowl, to accommodate themſelves to the cavity of the Uterus, juſt as all the members of a chick are folded up to correſpond to the cavity of the egg which includes it, that in this ſituation I ſay the head is inclined forwards, the ſpine of the back crooked inwards, the thighs and legs folded ſo as that the heels approach the buttocks, and the toes are turned inwards, the arms bent, and the hands near the knees. On this occaſion, the ſpine of the back is turned to that of the mother, the head upwards, the face forwards, and the feet downwards; and in proportion as it grows and becomes larger, it gradually extends its members. About the laſt month of geſtation, that is, towards the end of the eighth month, it is turned upſide down, and then the head points to the internal orifice of the Uterus, and the Face is turned towards the Coccyx of the mother. The motions of the Fœtus towards the latter end of geſtation, are aſcribed to the impreſſions of the *Meconium* on the inteſtines, joined to the weight of the head inclined forwards.

ARTICLE II.

Of the Excluſion of the Fœtus.

AS for the excluſion of the Fœtus from the Uterus, it has no other ſhare in it except that by its weight or motions it lays a foundation for the contraction of the Uterus, which joined to that of the abdominal muſcles and Diaphragm, is ſufficient to occaſion the expulſion of the Fœtus; which ſeems to be proved, not only by the compoſition of the Uterus, but alſo by the expulſion of moles and falſe conceptions, to which we can aſcribe no motion, ſince they are only ſimple extraneous bodies lodged in the Uterus, and from which it is freed when it is overcharged by them.

Some

Some have aſſerted, that the Fœtuſes which come in the eighth month are weaker than thoſe which come in the ſeventh, but experience proves the contrary.

The Fœtus does not reſpire during its continuance in the Uterus, the membranes in which it is included oppoſing the entry of the air; but it is hardly excluded from its priſon till the air enters into its lungs, and produces conſiderable changes, for then we find them of a more lively colour, and they are even lighter than they were before. Every one knows the experiment made to diſcover whether an infant has died before or after its birth. 'Tis the common opinion, that to be convinced of the truth in this caſe, we ought to put a piece of the infant's lungs into water, and if it ſwims it is a proof that it has reſpired, and conſequently been alive.

Tho' this experiment appears convincing to abſolve or condemn perſons accuſed of *Infanticide*, yet it is proved by many facts, that it is not ſo infallible as it is imagined to prove whether the infant is born dead, or lived ſome time after its birth *.

The lungs of a child dead before its birth ſometimes ſwim in water. This happens when immediately after its birth we blow into its mouth, as ſome midwives do, when they doubt whether the child is really dead. *Bohnius* ſays, he has ſeveral times diſcovered the truth of this experiment, both on children and puppies. This alſo happens when the child has died long before it was born, for then putrefaction produces in the lungs a rarefaction which makes them float in water, as in rivers we ſee dead bodies float after they have continued long at the bottom of the water.

* See Bohnius de Officio Medici, and another work of his, entitled De Renunciatione Vulnerum.

Tho' the infant ſhould be born alive, yet its lungs ſometimes ſink in water. This happens when the child being born does not reſpire, for it is an error to think that the infant cannot ſurvive its birth ſome moments without breathing. Some infants immediately after their birth have neither ſenſation nor reſpiration, till being warm'd by the methods uſual on ſuch occaſions, they begin to breath and cry; beſides, other infants have been born in their membranes*. Now 'tis certain the infant does not reſpire while thus ſhut up.

Overcamp in his animal Œconomy ſays, that ſometimes the lungs of a child born without life float on the water, becauſe by the efforts of labour, and the rupture of the membranes, the infant reſpires before delivery. The author adds, that he has made this obſervation on four children, born at different times by the ſame mother.

Bhonius affirms, that if we ſtrangle puppies immediately after they are litter'd, their lungs will float on the water.

It ſometimes happens, that among the ſeveral portions cut off the lungs of an infant born alive, ſome will float and others ſink, which proceeds from this, that as ſoon as the infant is born all the parts of the lungs are not equally filled with air, becauſe ſome of them require more, and others leſs time to admit this air.

There have been children who having cried after their birth, and conſequently reſpired, have been buried alive, and when afterwards taken up, their lungs have ſunk like a ſtone in water.

The author adds, that a woman of *Leipſic*, accuſed of having murdered her child, denied the fact abſolutely, and when the experiment was made on the lungs they ſunk to the bottom of the water. This

* See Harvey de Partu.

woman

woman however some days after confessed that her infant was born alive, and that she had killed it, which she continued to affirm till her death.

There are very considerable differences between some parts of infants, and those of adults. I shall not here repeat what I have said in the Osteology concerning the bones of the Fœtus, but shall confine myself to the soft parts.

With respect to the lower belly, we observe that the umbilical ring is open, and that the umbilical vein and arteries which go to it retain a considerable cavity, and that the venous duct is also hollow. There is generally in the stomach of a Fœtus a glairous humour of a whitish colour, as well as in the small intestines, whereas the large intestines are almost continually full of a black and viscid humour called the *Meconium*, which is thicker than the liquor of the stomach and small intestines. The bulk of the liver is more considerable in proportion than in adults, as well as the appendix of the *Cæcum*. The *Capsulæ Atrabiliares* are also more considerable in infants, being almost as large as the kidneys, whose surface is unequal like that of the kidneys of a calf. The bladder is also somewhat lengthened, inclining towards the navel.

As for the breast, in it we observe that the gland called *Thymus* is of a very considerable bulk, that the arterial canal retains its cavity, that the *Foramen Ovale* is open, that the lungs examined before the Fœtus has respired are of a blackish colour, and that their substance, instead of being spongeous as in adults, is very compact, so that a piece of them thrown into water sinks.

As for the head, its bulk in general is usually more considerable in proportion in a Fœtus than in adults. I shall here say nothing of the Fontanel, nor of the interstices which the bones of the Cranium leave between each other, having mentioned them formerly.

merly. As for the particular diſpoſition of the *Meatus Auditorius* examined in a *Fœtus*, beſides what I have ſaid of it in the Oſteology, I ſhall mention it in deſcribing that organ.

CHAP. XIII.

Of the Breaſt.

THE ſecond cavity of the trunk, or the middle venter, is called *Thorax* or the breaſt, tho' commonly this laſt name is only given to its anterior part, while the poſterior is called the back.

The cavity of the breaſt is larger in its inferior than in its ſuperior part. This cavity is bounded in its inferior part by the Diaphragm, in its ſuperior by the two firſt true ribs, to which ſome have added the Clavicles, in its anterior part by the Sternum and anterior extremity of the ribs, and in their poſterior part by the Vertebræ of the back and the poſterior extremity of the ribs.

The parts which compoſe the breaſt are diſtinguiſhed into containing and contained; the containing parts are divided into common and proper; the common are the general coverings of the body, that is to ſay, the ſkin and the fat.

The proper containing parts are bony, fleſhy, and membranous. Among the bony parts we count the ribs, the Vertebræ of the back, and the Sternum; among the fleſhy we principally reckon the intercoſtal muſcles, thoſe which compoſe the triangular muſcles called the Sterno-coſtals, and the Diaphragm; among the membranes, we count only the Pleura.

I ſhall not here repeat what has been ſaid of the ribs, and of the *Intercoſtal* and Sterno-coſtal muſcles. As for the Diaphragm, I ſhall ſpeak of it after the deſcription of the lungs.

The contained parts are principally the heart and the lungs.

ARTICLE I.

Of the Breaſts.

THE number, ſituation, and figure of the breaſts are too well known to require any deſcription. The bulk of the breaſts is very ſmall in young girls, but augments at the age of puberty, and becomes pretty conſiderable in pregnant women and nurſes. This bulk is diminiſhed in old age, and in ſome countries the breaſts are ſo long that the women can throw them over their ſhoulders.

The nipple, or round and ſomewhat long eminence in the middle of the breaſt, is perforated by ſeveral ſmall holes which correſpond to as many ducts, from which the milk is diſcharged. The ſkin which ſurrounds it forms a coloured circle called the *Areola*, whoſe colour is different, for in young girls it is of a lively red, which becomes more or leſs deep in proportion as they advance in years. Over the whole extent of the *Areola* we generally diſcover ſeveral ſmall eminences. Theſe are ſo many ſebacious glands, on the internal ſurface of the ſkin which forms that circle. Theſe eminences are pierced with ſo many ſmall holes or Lacunæ, thro' which we ſometimes ſee a lacteal ſeroſity, and even milk diſcharged, which moſt ordinarily happens to nurſes.

The breaſts of a nurſe, in order to be well conditioned, ought to be moderately firm, and of a pretty conſiderable bulk. They ought not to be

too ſtrongly adherent to the Sternum, but on the contrary to advance a little externally, in form of a pear. The nipple ought not to be ſunk but prominent, and in bulk and figure reſembling a ſmall nut, and the holes which, as I have ſaid, are found in it, ought to be free, that a moderate preſſure, either by the nurſe's fingers or the child's mouth, may be ſufficient to diſcharge the milk, as water is from a watering pot.

The milk of a nurſe to be good, ought to be white, mild, ſomewhat ſweet, and of a middling conſiſtence, that is to ſay, neither too ſerous nor too thick, ſo that on drawing ſome of it on the palm of the hand, it neither adheres too much to it nor flows off too eaſily, for if it is too ſerous it does not ſufficiently nouriſh the child, and if it is too thick, beſides the difficulty of drawing it out, it is of hard digeſtion. In a word, the nurſe ought to be ſound, of a good habit of body, and regular in Œconomy.

The better to diſcover the ſtructure of the breaſts, we muſt examine thoſe of a woman who has died in labour, or ſoon after, or when ſhe is a nurſe, by which means we will find that the glandulous body of the breaſt is loaded with a great deal of fat, which inſinuates itſelf into a number of cavities found in its ſurface, and moſt of which are pierced, ſo as to form ſo many holes ſufficiently large to receive the extremity of the little finger. The whole is interſperſed with nerves, arteries, and veins, and included in a kind of bag formed by the *Membrana Adipoſa.*

The nerves riſe from the *Dorſals*, and the arteries from the *Subclavians* and *Axiliaries*. The firſt are called internal Mammaries, and the ſecond external Mammaries. Theſe veſſels communicate with each other, and with the Epigaſtric Arteries. The veins diſcharge themſelves into the Subclavians and Axiliaries,

liaries, and alſo communicate with the Epigaſtric veins.

The glandular body of the breaſt in its middle and anterior part, includes a whitiſh and cellular ſubſtance, which ſeems only to be formed of the aſſemblage of ſeveral excretory ducts, which come from every part of this glandulous body. Theſe ducts or lacteal canals are narrow at their origin, and afterwards dilated at the part where by their union and communication they form a kind of confluent ſubſtance, where the milk is diſcharged thro' theſe ducts, and remains till it is abſorb'd by other ducts which riſe from this receptacle to the number of eight or ten, and terminate at the nipple, advancing to its ſurface. The interſtices between theſe ducts is poſſeſſed by a ſpongeous texture, and by ſeveral ligamentous and elaſtic filaments which follow the length of theſe ducts. The whole is cover'd with a very fine membrane, interſperſed with many nervous filaments. This ſtructure not only renders the nipple of an exquiſite ſenſation, but alſo permits it to become ſtiff when the infant ſucks, which is neceſſary, that the lacteal ducts which run thro' the nipple may be more diſpoſed to receive the milk which is furniſhed to them by the common receptacle. The better to ſee this ſtructure, beſides the choice of a breaſt, which I have already mentioned, we muſt divide its body into two equal parts by a vertical ſection, which ought to be continued upon the nipple, to divide it alſo according to its length, as Mr. *Morgagni* directs.

The Breaſts of men ſeem to be of no uſe, being only made of cutaneous Tubercles like a ſoft wart, more or leſs red, which is call'd the Nipple, and which is ſurrounded with a ſmall circle more or leſs brown. If there have been men, as ſome authors advance, who have furniſhed milk enough to nouriſh a child, 'tis to be preſumed that their

Breaſts have had nearly the ſame ſtructure with thoſe of women.

The great advantages of milk, conſidered, not only as an aliment, but alſo as a medicine, are ſufficient to make us pay a great regard to it. The cauſe of the good effects of milk is not difficult to comprehend. It is a chyle already digeſted, elaborated, and deſtin'd to ſupport and nouriſh; whence it naturally follows, that when it paſſes into the blood with its balſam and natural ſweetneſs, it muſt nouriſh more perfectly than any other aliment of whatever kind.

Milk is compoſed of three different parts; one *butyrous*, another *caſeous*, and a third *ſerous*. The *butyrous*, or the cream, is the fineſt and moſt alternated fat or ſulphureous part of which the fineſt butter is made. The *caſeous* is the moſt coarſe and fibrous part of the milk, which produces the different ſpecies of cheeſe. Laſtly, the *ſerous* part of the milk, or the whey, is a phlegm, which being impregnated with ſome ſaline particles, ſerves as a vehicle to the other parts. So long as milk remains in its natural ſtate, theſe three parts are ſo united that they cannot be diſtinguiſh'd; but upon the ſmalleſt alteration the ſeparation of theſe three parts is made as it were ſpontaneouſly.

ARTICLE II.

Of the Pleura, Mediaſtinum, and Thymus.

THE *Pleura* is a membrane of a pretty compact texture, which internally lines the Breaſt in all its extent, and even furniſhes a particular covering to all the parts included in this cavity. The internal ſurface of the Pleura is ſmooth and even, and always moiſten'd with a ſeroſity which oozes continually thro' the holes with which it is perforated. It is, externally, cover'd with a cellular tex-

ture

ture as well as the Peritonæum. We obſerve that the Pleura forms a pretty conſiderable folding oppoſite to the vertebræ of the back, which terminates all along the Sternum. This cavity is call'd the *Mediaſtinum*, and ſeparates the Breaſt into two cavities, one on the right and another on the left ſide. Theſe cavities are not of an equal bulk, ſince the Mediaſtinum, inſtead of adhering along the middle part of the *Sternum*, terminates laterally on the left along that bone, in the part where it is joined with the cartilages of the ribs. This obliquity of the Mediaſtinum is the reaſon why the right is larger than the left cavity.

The two Laminæ, which compoſe the *Mediaſtinum*, are not ſeparated from each other immediately behind the Sternum in their anterior part; but they are afterwards divided to lodge ſeveral parts, as the *Pericardium*, a portion of the Trachea Arteria, and Œſophagus, the Thoracic Duct, *&c.* Each Lamina alſo forms a particular bag to include the two Lungs.

The Pleura receives its Arteries from the Intercoſtals; the internal Mammaries alſo furniſh it with ſome. Its Veins diſcharge themſelves into thoſe of the ſame name, and the Nerves ariſe principally from the dorſal Pairs.

The Mediaſtinum has its particular veſſels call'd mediaſtinal Arteries and Veins: The Arteries proceed from the internal Mammaries, and the Veins which accompany them, diſcharge themſelves into the Veins of the ſame name.

The principal uſes of the Mediaſtinum, are *1ſt.* To hinder the blood, pus and ſeroſities extravaſated in one ſide of the Breaſt, from going into the oppoſite ſide. *2d.* By means of this partition, one of the ſides of the Breaſt being open'd, reſpiration continues intire in the other, by which means a ſuffocation is prevented. *3d.* It hinders one of the

Lungs

Lungs from preſſing upon the other when we lye on one of the ſides.

The Antients believed that the two Laminæ which compoſe the Mediaſtinum, form'd a cavity in its anterior part. *Bartholin* has demonſtrated the falſeneſs of this opinion, and we may be convinced of it, if inſtead of raiſing the Sternum we cut on each ſide the Cartilages of the Ribs, about an inch diſtant from that bone.

The *Thymus* is a glandulous oblong body, ſomewhat round above, and divided below into two Lobes, the left of which is generally longeſt, and ſometimes extends to the Diaphragm. The bulk of the Thymus is more conſiderable in the *Fœtus*, but diminiſhes inſenſibly in adults: It is moſt uſually ſituated at the upper of the Mediaſtinum, between the two ſmall membranous leaves which compoſe it. In the *Fœtus* the Thymus advances to the inferior part of the neck. There are particular veſſels, both Arteries and Veins, which are call'd *Thymic*. The Arteries are ramifications of thoſe call'd the *mediaſtinal* and the *internal Mammaries*. The Veins diſcharge themſelves into the *Mediaſtinals*, the internal *Mammaries*, and ſometimes into the *Jugulars*.

Anatomiſts are not agreed with reſpect to the ſtructure of this gland. Some look upon it as a conglobate, and others as a conglomerate gland. 'Tis probable, that its uſe particularly regards the Fœtus; but it is not as yet ſufficiently known to determine what it is.

ARTICLE III.

Of the Heart and the Parts depending on it.

THE *Pericardium* is a membranous ſack, of a pretty firm texture, which immediately includes the Heart, and is placed between the two leaves of the Mediaſtinum. The capacity and figure

figure of the Pericardium, correſpond to thoſe of the Heart. However we obſerve, that it leaves a ſufficient ſpace, for the facility of the motions of this organ.

The connexions of the Pericardium are with the principal veſſels of the Heart; it is alſo adherent in a great part of its extent, to the aponeurotic portion, or nervous center of the Diaphragm; and laſtly, to the two Laminæ of the Mediaſtinum. The adheſion of the Pericardium to the Diaphragm facilitates its play or action, which might otherwiſe have been conſtrain'd by the weight of the abdominal Viſcera which adhere to it.

The internal ſurface of the Pericardium is very ſmooth, and always moiſten'd with a lymphatic Seroſity which oozes continually thro' the ſmall holes with which this membrane is pierced: Some have ſaid, that this Seroſity was neceſſary to refreſh the Heart, or maintain the flexibility of its Fibres; but 'tis probable, that its uſe is to facilitate the motions of the Heart, by hindering the Pericardium from adhering to its ſurface. As for the flexibility of the Fibres of the Heart, it ſeems rather to depend on the fat of its baſe, than on the Seroſity of the Pericardium, which is found in a ſufficient quantity in perſons who die of tedious indiſpoſitions.

The Heart is a hollow muſcle, which we ought to look upon as the principal organ of the circulation of the blood. Its figure is nearly conical, and we diſtinguiſh in it two ſurfaces, one convex and the other flat, two edges, one more and the other leſs blunt; and laſtly, its baſe and its point.

The Heart is included in the Pericardium, and ſituated obliquely in the middle of the anterior part of the Breaſt; lying as it were by its flat ſurface, on the Diaphragm, in ſuch a manner, that its baſe or broadeſt part is ſuperior, and anſwers to the middle of the Breaſt, while its point is turned to the left ſide.

At

At the baſe of the Heart we find a large quantity of fat, ſome ſmall conglobate glands, and four conſiderable veſſels, which correſpond in two cavities form'd in the thickneſs of that organ, which are call'd Ventricles; and which, from their ſituation, are diſtinguiſh'd into right and left, or, more properly, into anterior and poſterior.

The four conſiderable veſſels obſervable at the baſe of the Heart; are two Arteries and two Veins. There is an Artery and Vein for each Ventricle. The Veins do not open immediately into the Ventricles, and only communicate with theſe cavities, by means of two particular receptacles placed at the baſe of the Heart, placed between the mouths of the Veins, and the orifices of the Ventricles; ſo that theſe two receptacles communicate on one ſide with the Veins, and on the other with the Ventricles. Theſe receptacles are call'd the Auricles of the Heart, one of which correſponds to the right, and the other to the left Ventricle.

The veſſels of each Ventricle have particular names. The Vein which correſponds to the right Auricle, is call'd the Vena Cava. It diſcharges into this receptacle, the blood which returns generally from all the parts of the body. The Artery which receives the blood from the right Ventricle to diſtribute it to the Lungs, is call'd *Pulmonary*, and the Vein which returns that blood into the left Auricle is alſo call'd Pulmonary. Laſtly, the Artery which receives it from the left Ventricle, to diſtribute it to all the parts of the body, is call'd the *Aorta* or great Artery.

But beſides theſe four large veſſels, there are alſo others diſtributed principally to the ſubſtance of the Heart, and that of the Auricles. Theſe laſt are of three ſorts; namely, Nerves, Arteries and Veins, both of the ſanguiferous and lymphatic kind.

The

The Nerves come from the *Plexus Cardiacus*, form'd by the eighth pair, and the intercoſtal on each ſide.

The Arteries are two, which ariſe from the Aorta at its coming out of the left Ventricle; and after having each embraced the half of the baſe of the Heart, at the part where it is join'd with the Auricles, they are diſtributed to all its ſubſtance, and to that of the Auricles. Theſe are call'd *coronary* Arteries.

The Veins which accompany them are alſo call'd *Coronary*, and diſcharge themſelves by one trunk into the right Auricle. We obſerve a ſemilunar Valve at the entrance of this trunk. We have obſerved, that ſeveral ramifications of theſe Veins alſo diſcharge themſelves immediately into the cavity of the Ventricles. The lymphatic accompany the ſanguiferous Veins and reach the glandular Granulations, which are found at the baſe of the Heart.

The Auricles are two hollow Muſcles as well as the Ventricles: They have each two orifices, of which one correſponds to the Vein which diſcharges itſelf in it, and the other to the Ventricle which is joined to it. Each Auricle terminates in a point at its anterior part, where it forms a kind of ſack.

The Auricles are not of an equal bulk, ſince we obſerve that the cavity of the right, is more conſiderable than that of the left.

Each Auricle is compoſed of a double rank of fleſhy Fibres, moſt of which are ſemicircular. They are fortified by others which have the form of pillars, and which leave pretty conſiderable Interſtices between them, which renders the ſides of the Auricles very thin in theſe parts. Theſe laſt Fibres advance to the orifices of the Auricles, and terminate by a kind of tendon which ſurrounds theſe orifices.

The

The Auricles are united to each other by Fibres which are common to them. Theſe Fibres have made ſome Anatomiſts imagine, that thoſe two receptacles were but one muſcle. It is in the partition form'd by the union of the Auricles, that we find the Foramen Ovale in Fœtuſes.

As for the fleſhy Fibres which compoſe the Ventricles, it has been diſcover'd * that each Ventricle has its particular Fibres, moſt of which are obliquely circular. We may therefore conſider the Ventricles as two hollow Muſcles, which being join'd together, concur to form the partition which divides them, and which is call'd the *Septum Medium*; this partition being only form'd by the union of the Ventricles; and they are maintain'd, thus united, by a plan of fleſhy Fibres which is common to them. Theſe Fibres are the firſt which preſent themſelves, after the removal of the external membrane of the Heart; they deſcend obliquely from its baſe to its point, running thither from the right to the left; and being arrived there, they re-unite for the moſt part, turning in the form of a vice, and penetrate into the the cavity of the Ventricles, eſpecially that of the left, where they loſe themſelves. Theſe Fibres go to form thoſe eminences which are found in both Ventricles, and which are call'd fleſhy pillars.

'Tis to be obſerv'd, that the ſides of the right Ventricle are thinner than thoſe of the left; and that the cavities of both, tho' unequal, extend to the point of the Heart, where its ſides are ſo thin, that they ſeem only to be form'd by the union of the external membrane of this organ, with that which lines the Ventricles.

* See Mr. *Winſlow*'s Memoirs of the Royal Academy of Sciences, 1701. And Mr. *Vieuſſens* in his treatiſe of the Heart.

In the Ventricles, beſides the fleſhy columns, which are three in the right and only two in the left, we are to conſider ſeveral blind cavities, to which correſpond the mouths of ſo many branches of the *Vena Coronaria* which diſcharge themſelves there †.

Each Ventricle has two orifices, one which correſponds to the Auricle, and the other to the Artery which riſes from the ſame Ventricle. In the orifices which correſpond to the Auricles, we find membranes which adhere firmly to the circumference of theſe orifices. Theſe membranes are of a particular figure, being broad at the ſide of the Auricle, and diminiſhing in proportion as they are removed from it. We obſerve, that in the circumference of the reſt of their extent, there are a great many pretty ſtrong tendinous Fibres adhering, which ariſe from the fleſhy columns: Theſe different membranes are call'd *Valves* or *Suckers.* There are three of them at the orifice of the right Ventricle, which correſponds to the Auricle on the ſame ſide, and two of them at the orifice of the left Ventricle, which correſponds to the left Auricle, and theſe Valves are diſtinguiſh'd by particular names: The Valves of the right Ventricle are call'd *Tricuſpides* or *Triglochines*, on account of the triangular figure ſuppoſed to be found in them: The Valves of the left Auricle are call'd *Mitrales*, becauſe, they being only two, placed oppoſite to each other, they repreſent a kind of inverted mitre.

In the orifices of the Ventricles which correſpond to the pulmonary Artery, and the Aorta, we alſo find membranes diſpoſed in the manner of *Suckers*, or of Valves. They differ however from the firſt, not only by their figure, but alſo by their adheſions to theſe orifices. They differ from them by their figure, ſince theſe laſt reſemble a creſcent; and they

† See *Vieuſſen*'s treatiſe of the Heart.

differ

differ in the ſecond place, by their adheſions to theſe orifices, ſince they are fixed to them by all their inferior part, or by their convex border; and becauſe they are free by their ſuperior part, or by their concave edge.

We eaſily perceive, by the different manner in which the Valves of the Auricles and thoſe of the Arteries are adherent, the firſt being ſo by their ſuperior part, and the laſt only by their inferior portion. I ſay, we may eaſily perceive, that the Valves of the Auricles open from without inwards; and that on the contrary, thoſe of the Arteries open from within outwards. The Valves at the beginning of the Arteries are call'd *Sigmoide*, and are ſix in number, three for each Artery. We have obſerved, that the concave edge of theſe Valves forms two ſmall creſcents, and that at the meeting of theſe two creſcents there is a ſmall Tubercle. We have alſo obſerved, that thoſe Valves are furniſhed with ſeveral fleſhy Fibres, which follow the direction of each Valve; and laſtly, that theſe of the Aorta correſpond to the orifices of the coronary Arteries, ſo that theſe orifices are cloſed every time that the Valves are applied to the ſides of the Aorta.

The Heart is a Muſcle, or rather a compoſition of two hollow Muſcles, capable as well as other Muſcles of being contracted and relax'd. In the relaxation of the Fibres of the Heart, its two Ventricles are dilated, and this motion is call'd the *Diaſtole* of the Heart. In the contraction of theſe ſame Fibres the Ventricles of the Heart are contracted, and this motion is call'd *Syſtolæ*.

The Auricles are alſo two hollow Muſcles, and at the ſame time the antagoniſts of the Ventricles; for this reaſon they are contracted during the dilatation of the Ventricles, and dilated during their contraction. The two Arteries which correſpond

to

to the Ventricles are alſo capable of dilatation and contraction; but theſe motions are contrary to thoſe of the Ventricles, that is to ſay, they are dilated when the Ventricles are contracted, and contracted while they are dilated.

We muſt therefore perceive, that the blood which returns from all the parts to the Heart, thro' the Veins, enters firſt into the Auricles which are then dilated, and the Auricles afterwards contracting, force the blood they contain to enter into the Ventricles, which being dilated in their turn, receive the blood which is forced into their cavity. But the Ventricles in contracting, would not fail to repel the blood into the Auricles, if there were not at their mouths the *mitral Valves*, whoſe ſtructure renders them capable of oppoſing the return of the blood: It is therefore obliged to enter the Arteries, where it finds no reſiſtance; the Valves, which I have ſaid are there, opening from within outwards, contrary to thoſe which are at the mouths of the Auricles, which open from without inwards. The blood of the right Ventricle is therefore furniſhed in the Lungs, by the pulmonary Artery, while that of the left Ventricle is generally propell'd into all the parts of the body by the Aorta. But as theſe veſſels, which have been dilated during the contraction of the Ventricles by the blood which has enter'd into their cavities, do not fail to contract themſelves as ſoon as that liquor ceaſes to make an effort againſt their ſides, the blood would have no doubt enter'd into the Ventricles: And theſe Valves only oppoſe it, in as far as they approach to and even unite with each other, in receding from the ſides of the veſſels to which they had been applied by the blood which the Ventricles have forced thither. We are to judge the ſame way of the *triglochine* and *mitral* Valves, that is to ſay, that they are applied to the ſides of the Ventricles, while

the blood forced from the Auricles enters their cavity, and while the Ventricles are dilated; but that they do not oppoſe the return of the blood into the Auricles, except in ſo far as they unite with each other in receding from the ſides of the Ventricles.

If it is true. as we cannot doubt, that the blood only enters both into the Auricles and Ventricles during the dilatation of both, and that on the contrary it is only forced from them by their contraction, we ought not to be aſtoniſhed, if in examining the motions of the Auricles and Ventricles in a frog, we ſee them both become red during their dilatation, and pale during their contraction.

Tho' it is evident from what I have ſaid that the blood only enters the Aorta and Pulmonary Artery, during the contraction of the ventricles, yet this does not hold true with reſpect to that blood which is diſtributed in the ſubſtance of the heart by the Coronary arteries. As the mouths of theſe veſſels correſpond to the Aorta immediately behind the Sigmoide valves, theſe mouths are cloſed in the contraction of the heart, by the application of theſe valves to the ſides of the Aorta, as I have already obſerved; but the Aorta afterwards contracting, and the Sigmoide valves ceaſing to be applied againſt its ſides, rhe mouth of the Coronary arteries becomes free, and the blood can eaſily enter their cavities.

From what I have ſaid 'tis obvious, that the blood paſſes ftom the heart to all the parts thro' the arteries, and that a portion of this blood returns to the heart thro' the veins. This motion of the blood from the heart to all the parts, and from all the parts to the heart, is called the circulation or circulatory motion, which is produced by two cauſes, namely, the motion of the heart and that of the arteries.

arteries. To underſtand this mechaniſm the more eaſily, we muſt imagine to ourſelves the heart, arteries, and veins all full of blood. When the heart is contracted, a certain quantity of blood propell'd into the veins neceſſarily forces them to dilate themſelves. Now this dilatation cannot happen without producing a greater tenſion of the fibres which compoſe theſe veſſels, and as they are elaſtic, it muſt neceſſarily happen that as ſoon as the action of the blood ceaſes, theſe fibres return to their primitive ſtate; they will conſequently propel the blood into the parts where the leaſt reſiſtance is found. Now this reſiſtance is leaſt in the veins, for the return of the blood from the arteries to the heart is impeded by the Sigmoide valves, which are at the beginning of the Aorta. It will therefore paſs into the veins, which obliges it to move and flow into the different parts of the body, and at laſt to return to the heart.

The return of the blood to the heart thro' the veins is facilitated not only by the new blood which paſſes continually from the arteries to the veins, but alſo by the diſpoſition of the valves which are within the veins, principally in thoſe thro' which the blood is to remount contrary to its own weight; ſuch is that which returns from the inferior extremities when we ſtand upright. To this we ought alſo to add the pulſations of the arteries which generally accompany the veins, the contraction of the muſcles, *&c.*

The circulation of the blood is not at preſent doubted of, and without determining whether the honour of this diſcovery is due to *Fabricius ab Aquapendente*, to Father *Fabri* the Jeſuit, or to the celebrated *Harvey*, it muſt be confeſſed, that among all thoſe hitherto made, there is none made that is more certain or more uſeful. It is proved by a great many demonſtrative reaſons, drawn from the ligature of

the arteries and veins, and from the aperture of theſe veſſels. Beſides, by a microſcope we clearly ſee the blood flowing in theſe veſſels, thro' the thin and tranſparent texture of the *Meſentery* of a *Frog*, of the *Tail* of a *Bull-head*, &c. It permits us to follow it, and even to diſtinguiſh its motions.

I paſs over in ſilence ſeveral particularities relating to this circular motion of the blood, for beſides that they ſuppoſe a knowledge of all the veſſels thro' which it flows, I ſhould be obliged to deſcribe the ſtructure of moſt of the Viſcera, which I could not do without exceeding the bounds of the abſtract I propoſed to give.

If we examine the motions of the heart in a frog, we do not ſee it ſhortened in its Syſtole by a kind of ſpiral Contorſion, as ſome have advanced; it is on the contrary rather lengthen'd, or at leaſt it preſerves its natural length in contracting its two Ventricles equally and directly, which is an effect of the arrangement of its fleſhy fibres, among which the number of circular greatly ſurpaſſes the longitudinal and oblique.

Mr. *Vieuſſen* ſays, he found in the body of a ſoldier of thirty-five years of age, who died of a defluxion of the breaſt, two hearts, of which that which he took to be the natural one had no fault in its conformation, and poſſeſſed its uſual ſituation, but it was deſtitute of its Pericardium. *Columbus* has made the ſame obſervation with reſpect to the Pericardium. The ſecond, or ſupernumerary heart, whoſe figure was pyramidal, and which was as large as a hen's egg, had a Pericardium, which was adherent to its external ſurface. A large branch of each ſubclavian vein was inſerted into its baſe and its cavity, which terminated on its right ſide at the ſuperior trunk of the Vena Cava. This heart had no Auricles, but only the cavity I have mentioned,

which

which may be looked upon as a Ventricle. The ſituation of this ſupernumerary heart was above the natural one, and touched its baſs by its point *.

ARTICLE IV.

Of the Lungs and Diaphragm.

THE Lungs are two ſpongeous bodies, ſituated in the breaſt. They are ſeparated from each other by the Mediaſtinum, and the heart placed between them. Each lung is divided into Lobes; the right has generally three, and the left only two, and theſe lobes are divided into a great many more.

The Lungs are convex, and elevated towards the ribs, a little concave next to the Diaphragm, and flat on the ſide of the *Mediaſtinum*, ſo that when viewed poſteriorly they pretty much reſemble an ox's foot. The left lung has this particular, that at the lower end of its anterior edge there is a denticulated groove, oppoſite to the point of the heart, ſo that it never covers this point even in the greateſt inſpiration.

The Lungs are not only adherent to the Sternum, and the Vertebræ of the back by the Mediaſtinum, and to the heart by its veſſels, but they are alſo connected with the tongue and the Pharynx by means of a duct peculiar to them, which is called the *Trachea Arteria*. Laſtly, we obſerve in them two membranous ligaments, which from the poſterior edge of each Lung go to terminate at the Vertebræ of the back, advancing to the Diaphragm.

The colour of the lungs is a beautiful red in children, but afterwards this colour is changed

* See *Vieuſſen*'s treatiſe of the heart.

into a cineritious white, and in old perſons they are of a blueiſh colour, and ſometimes livid.

The lungs are covered with a membrane which is continuous to the Pleura, and which is compoſed of two Laminæ, one external and the other internal. The internal Lamina forms ſeveral partitions, which penetrate the ſubſtance of the Lungs, and divide it into a vaſt number of ſmall bodies called Lobules, of an angular figure, and pretty different from each other. Theſe Lobules leave ſome interſtices between them, and in theſe interſtices are the nerves and blood veſſels, which are ramified on the external ſurface of the Lobules. We alſo find in theſe interſtices a cellular texture, which ſurrounds the ſanguiferous and nervous veſſels.

Mr. *Helvetius* * has diſcovered that each Lobule is principally compoſed of a vaſt number of Cellules of an unequal bulk, and of a very irregular figure, which all communicate with each other, and with one of the ramifications of a particular duct called the *Trachea Arteria*, ſo that there is always a road open from the ramifications of this duct to the lobes, and from theſe to the ſaid ramifications. The Cellules which compoſe a Lobe do not communicate with thoſe of the adjacent Lobule, nor with the capillary ſanguiferous ramifications which are diſtributed over their external ſurface, ſo that if we blow into one of the ramifications of the Trachea Arteria which runs to one of theſe Lobules, the air does not paſs into the Cellules of the adjacent Lobule; and if we gently force a liquor into the veſſels of the Lungs, the capillary ramifications which creep upon the Cellules of the Lobules are filled, without the liquor thruſt into theſe veſſels penetrating the cavity of the Cellules.

* See memoirs of the royal academy of ſciences, Ann. 1718.

We

We may therefore affirm, that the air does not paſs from one Lobule to another, but only from the Lobules into their Interſtices, that is to ſay, into the Cellules which ſurround the veſſels, and run thro' the Interſtices of the Lobules, and it afterwards paſſes from theſe Interſtices or Cellules thro' the Lobules.

There are therefore two ſorts of Cellules in the Lungs, ſome of which compoſe the Lobules, and others ſurround the veſſels, both ſanguiferous and nervous, which run thro' the interſtice of the Lobules. Theſe laſt are called vaſcular Cellules, to diſtinguiſh them from thoſe which compoſe the Lobules called *Bronchic Cellules*, becauſe they communicate with the ramifications of the Trachea Arteria called *Bronchia*.

The *Trachea Arteria* is a duct which begins at the bottom of the mouth with which it communicates, and deſcending along the middle and anterior part of the neck, it loſes itſelf in the lungs, thro' which it is diſtributed by a great number of ramifications.

We diſtinguiſh the *Trachea Arteria* into three parts, one ſuperior, one middle, and one inferior. The ſuperior is called the *Larynx*, the middle retains the name of *Trachea Arteria*, and the inferior, which is the diviſion of this laſt into two ramifications, which are divided into ſeveral others, is called the *Bronchia*.

The *Larynx* is compoſed of cartilages, ligaments, glands, muſcles, and membranes. The cartilages are five in number, the firſt and moſt conſiderable of which is called the *Thymus* or *Cartilago Scutiformis*; it is a little convex in its anterior, and concave in its poſterior part. This cartilage forms the eminence commonly called *Pomum Adami*. This cartilage, whoſe figure is nearly ſquare, terminates by four productions called horns, the ſuperior of

which are by a ſtrong ligament joined to the extremity of the horns of the *Os Hyoides*, and the inferior to the cartilage placed below it, which is called the cricoide cartilage.

The *Cricoide*, otherwiſe called the *annular* cartilage, becauſe it goes quite round the Larynx, is ſituated below the Thyroide. The anterior part of this cartilage is narrower than the poſterior, and above the poſterior part of this cartilage are placed thoſe called *Arytenoide*.

The *Arytenoides* are two cartilages whoſe figure is nearly pyramidal. They are joined by their baſe, and at a ſmall diſtance from each other, with the *Cricoide*, and in ſuch a manner that they can move upon the *Cricoide* in approaching or receding from each other, as I have ſaid in treating of the muſcles which move theſe two cartilages. The anterior part of theſe cartilages is convex, and the poſterior concave, forming as it were a kind of groove. Theſe cartilages at their baſe leave a ſpace which is diminiſhed by two ligamentary cords, which complete the aperture called the Glottis, whoſe figure reſembles that of a pretty long triangle, forming a kind of V conſonant, whoſe point, which is forwards, begins at the middle of the internal ſurface of the Thyroide, and the baſe lies towards the *Arytenoides*, where this aperture terminates, its lateral parts being formed by theſe two ligamentary cords which I have mentioned before, which are fixed at one part to the baſe of the *Arytenoides*, and terminate in approaching to each other at the middle of the internal and inferior part of the Thyroide cartilage, and at the adjacent portion of the Crycoide.

Immediately above theſe ligamentary cords there are two others, which have the ſame extent and the ſame adheſions with the former. They alſo run from behind forwards, and the interſtices between

theſe ligaments forms on each ſide a tranſverſe fiſſure, which is the aperture or mouth of a ſmall membranous ſack. The ancients have called theſe two cavities the *Ventricles* of the *Larynx*, but they are now called the Sinuſes of the *Larynx*. The membrane which forms the ſides of theſe two cavities, is the continuation of that which lines the whole internal part of the Larynx. This membrane is very ſenſible, and continually moiſtened by a ſeroſity furniſhed from the glandular granulations concealed behind this membrane.

Mr. *Morgagni* on the anterior part of the arytenoide cartilage has diſcovered two ſmall glands, which from their ſituation he calls *Arytenoidean*. Theſe are among the number of the conglomerate glands, and their uſe is to furniſh a lymphatic humour, which moiſtens the internal part of the Larynx.

The fifth, and at the ſame time the moſt elevated cartilage of the *Larynx* is called *Epiglottis*, becauſe it is ſituated above the *Glottis*. It is fixed to the internal ſurface of the *Thyroide*. This cartilage has two ſurfaces, one convex and the other concave; the convex is forwards, and the concave towards the *Glottis*. This cartilage is in all its extent perforated with a great many ſmall holes, which run thro' its ſubſtance. 'Tis thro' theſe holes that the lymphatic ſeroſity is diſcharged, which is furniſhed by a gland placed on the convex part of this cartilage.

The *Epiglottis* has three principal ligaments, which may be looked upon as ſo many muſcles, for in their thickneſs we diſcover fleſhy fibres. The firſt, which is anterior, is fixed in one part all along the convex part of the Epiglottis, and in another to the baſe of the *Os Hyoides*, and to the external membrane of the tongue, with which it appears continuous. Some call this ligament the bridle of the *Epiglottis*.

glottis. The two other ligaments are fixed in one part to the Arytenoides, and in another to the lateral parts of the *Epiglottis*, which they depreſs in deglutition.

Immediately at the anterior and inferior part of the *Larynx*, there is a gland commonly called *Thyroidean*, whoſe figure reſembles that of a creſcent, for at its extremities it has two prominences in form of horns, which are turned upwards, and terminate at the lateral parts of the *Thyroide* and *Cricoide* cartilages, and at the adjacent portions of the *Œſophagus*. The middle part of this gland is fixed to the upper part of the *Trachea Arteria*, properly ſo called. Its uſe is not known, becauſe we have not as yet diſcovered that it has any excretory duct.

The portion of the duct, from the *Larynx* to the Lungs, retains the name of *Trachea Arteria*. It is a duct partly cartilaginous and partly membranous, which begins at the Larynx, deſcends along the middle and anterior part of the neck, enters into the breaſt, and terminates about the fourth Vertebra of the back, where it is divided into two branches, which I ſhall afterwards conſider.

The anterior part of the *Trachea Arteria* is cartilaginous, and the poſterior membranous. The cartilages which compoſe the *Trachea Arteria* are ſixteen or eighteen, but rarely twenty in number. They do not complete the circle, but want about a third of it. The extremities or cones of the cartilages are thinner than the reſt of their extent, and for the moſt part unite with thoſe of the adjacent cartilages. All theſe cartilages are ſituated tranſverſely, and at equal diſtances from each other. The interſtice which they leave between them is about a line. It is poſſeſſed by a ligamentary and elaſtic membrane, which adheres to each ring. The remainder of each cartilage is included in a pretty thick membrane, furniſhed

niſhed with ſeveral glandular granulations interſperſed one by one.

The whole duct of the *Trachea Arteria* is alſo covered internally with a membrane which forms many foldings, which extend according to its length, and even continue to the *Bronchia.* This membrane is nervous, and of a very exquiſite ſenſation; it is continually moiſtened with a lymphatic Seroſity, furniſhed by a great number of glands concealed behind it. Beyond theſe glands we find two plans of fleſhy fibres, of which the interior are circular and the external longitudinal; the whole is at laſt cover'd externally with a coat, which appears to be a continuation of the membrane of the lungs. We obſerve, that the Œſophagus lies laterally to the left, along the cartilaginous portion of the *Trachea Arteria*, and only in one part touches its membranous portion.

The *Larynx* and *Trachea Arteria* receive nerves from the eighth pair, the principal of which are called *Recurrent*. Its arteries ariſe from the external Carotids, and its veins diſcharge themſelves into the Jugulars.

The *Trachea Arteria* having reached to about the fourth Vertebra of the back, is divided into two branches called the *Bronchia.* Theſe branches retain their membranous portion till their entry into the lungs, where they furniſh as many ramifications as the lungs form ſmall Lobes.

'Tis to be obſerved, that the different ramifications of the *Bronchia* are internally covered with the ſame membranes as the *Trachea Arteria*, and have alſo their cartilages diſpoſed nearly in the ſame manner; with this difference however, that of ſemicircular, which they were before the entrance of the Bronchia into the lungs, they become circular as ſoon as they have entered them. This continues in all their diviſions, to the very fineſt ramifications which

which become membranous, loſing themſelves in the Cellules which compoſe the Lobules.

We alſo obſerve, that the cartilages of the *Bronchia* have this in particular, 1*ſt*, That the inferior is much ſmaller than the ſuperior cartilage; 2*d*, That theſe cartilages are interrupted and broken, that is, the circle which compoſes them conſiſts of three or four pieces.

In the lungs we diſcover ſeveral blackiſh glands, which are found at each diviſion of the *Bronchia*, from the firſt to the moſt remote of theſe diviſions, and theſe are called *Bronchial Glands*. Their bulk is different, and the largeſt are as big as a ſmall nut, while others are no larger than a pea. Some look upon theſe glands as conglobate, but others think them conglomerate. The abettors of this laſt opinion aſſert, that the excretory ducts of theſe glands diſcharge into the cavity of the *Bronchia* a lymphatic ſeroſity, which defends the ſides of the *Bronchia* from the too lively impreſſions of the air which continually paſs into the lungs.

Beſides the ramifications of the *Bronchia*, the *Lobules*, and the *Bronchial Glands*, there are alſo in the lungs nerves, arteries, and veins, both ſanguiferous and lymphatic. The nerves accompany the ramifications of the *Bronchia*, and thoſe of the ſanguiferous veſſels, and they ſpread themſelves by many filaments on the ſides of the Bronchial Cellules, as alſo upon the veſſels which they accompany. The nerves come from the *Pulmonary Plexuſes* ſituated on each ſide behind the lungs, and formed by the eighth pair and the Intercoſtal, as I ſhall ſhew in the *Neurology*.

As for the ſanguiferous veſſels, ſome furniſh the lungs with the matter of their nouriſhment, and others the blood which is to undergo ſome preparation in them. The firſt are the Bronchial arteries and

and veins, and the laſt the Pulmonary artery and vein.

The *Bronchial Arteries*, alſo called thoſe of *Ruyſch*, generally derive their origin from the Aorta Deſcendens immediately above and rarely below the firſt Intercoſtals, by one and ſometimes by two trunks which run obliquely to the lungs, dividing themſelves into a great many branches, which lie immediately over the *Bronchia*.

The Bronchial veins accompany the arteries in all their diſtributions, and generally diſcharge themſelves into the *Vena Azygos*, near the *Vena Cava ſuperior*, and ſometimes into the *Vena Cava* itſelf.

The other veſſels diſtributed to the lungs are called the *Pulmonary Artery* and *Vein*. The artery derives its origin from the right Ventricle, runs obliquely from the right to the left, being placed before the Aorta, it afterwards pierces the Pericardium, and is divided into three branches, one of which compoſes the arterial canal, which is of no uſe except in the Fœtus. Of the other two branches, one goes to the right and the other to the left lung. Theſe branches are divided into a great number of ramifications which accompany the *Bronchia*, and at laſt loſe themſelves in the Lobules.

The pulmonary vein accompanies the artery in all its ramifications, and after having received the blood brought by the pulmonary artery, it goes to diſcharge itſelf by four different branches into the *Pulmonary Sack*, which opens itſelf into the left Auricle. The ramifications of the pulmonary artery and vein, form the Vaſcular Plexus obſervable on the external ſurface of the Cellules of the Lobes.

Theſe different ramifications of ſanguiferous arteries and veins accompany the *Bronchia* in all their diviſions,

diviſions, ſlipping into the interſtices which the Lobules leave between them, and they are included in a cellular membrane, which forms the ſpongeous texture which I have ſaid is found in the interſtices of the Lobules.

Mr. *Helvetius* has obſerved, that the ramifications of the pulmonary artery are more numerous, and even more large than thoſe of the pulmonary vein; but it is quite otherwiſe with reſpect to the arteries and veins of the other parts of the body, in which we obſerve that the ramifications of the arteries are leſs numerous and ſmaller than thoſe of the veins.

As for the lymphatic veins, we eaſily diſcover them on the lungs of a horſe or an ox ſoon after they are dead. There have alſo been lymphatic veſſels obſerved in man, which terminated in the Thoracic Duct *.

The Diaphragm is a muſcular partition, which ſeparates the breaſt from the lower belly. It is ſituated obliquely in ſuch a manner, that its anterior is higher than its poſterior part, which deſcends lower, forming an oblique angle with the Vertebræ of the back. This partition forms a kind of arch, whoſe convexity is turned towards the breaſt. The Diaphragm is compoſed of two muſcles, one ſuperior and one inferior.

The ſuperior muſcle is the largeſt, conſtitutes the partition, and is in ſome manner curved. Towards the middle of this muſcle we obſerve a tendinous or aponeurotic part, which in ſome manner repreſents the leaf of clover graſs inſerted at the part of the pedicule. The ancients have called this tendinous part, the nervous center of the Diaphragm. Its fleſhy fibres are in the circumference, and are attached as it were by digitations to the

* See Mr. *Hunauld*'s memoirs of the royal academy of ſciences, 1734.

Xiphoide

Xiphoide cartilage, to the cartilages of the laſt true and all the falſe ribs, and even advance to the bony portion of ſome of theſe ribs. Moſt of theſe adheſions leave between them interſtices, which are only filled up by the *Peritoneum* and *Pleura*. 'Tis to be obſerved, that of all the lateral adheſions of this muſcle, thoſe on the right ſide appear a little lower than thoſe on the left; and that beſides this, its whole lateral right part is a little broader than the left, becauſe it is more arched.

The inferior muſcle of the Diaphragm is much ſmaller than the ſuperior, but it is thicker. At the ſuperior part it is engaged in the groove of the nervous center, from which it appears to be detached; and it is afterwards divided, forming as it were two wings, which run obliquely to the right and left, croſſing each other. They afterwards run about two fingers breadth without uniting, and leaving between them a nearly oval ſpace, thro' which the Œſophagus paſſes. Immediately behind or below the Œſophagus theſe two portions reunite by the croſſing of their fibres, and about an inch below they are again ſeparated, to afford a paſſage for the trunk of the Aorta inferior, the *Azygos*, and the thoracic duct, and at laſt terminate each by flat tendons of an unequal length at the bodies of the two ſuperior Vertebræ of the loins. We commonly call theſe two portions, the appendices of the Diaphragm.

This muſcle, beſides its adheſion above in the groove of the Aponeuroſis of the ſuperior muſcle, is alſo joined poſteriorly to the fleſhy portion of the ſame muſcle, and to the body of the laſt Vertebra of the back.

In the right lateral part of the nervous center of the Diaphragm, we obſerve a round aperture, which affords a paſſage for the trunk of the *Vena Cava inferior*. This aperture is ſo diſpoſed, that it

ſeems to defend this vein from the compreſſion which it might receive from theſe fibres when that muſcle acts; for we obſerve, that theſe fibres are generally turned obliquely over each other, nearly in the ſame manner as the ſmall ſlips of oſier are in the edges of ſmall baſkets.

From what has been ſaid it appears, that there are three conſiderable apertures in the Diaphragm, namely, one round in its aponeurotic portion for the tranſmiſſion of the *Vena Cava*, one oval in its fleſhy portion for that of the inferior portion of the *Œſophagus*, and a third whoſe circumference is partly fleſhy and partly tendinous, which, as I have before obſerved, affords a paſſage to the Aorta inferior and the thoracic ducts. The aperture for the Vena Cava lies to the right, that for the Œſophagus ſomewhat to the left, and the laſt, which reſembles a fork, is placed more towards the middle.

The ſuperior muſcle of the Diaphragm is lined on the ſide towards the breaſt with the Pleura, if we except that portion of its nervous center which correſponds to the Pericardium; its inferior part is covered by the Peritoneum.

The veſſels of the Diaphragm are nerves, arteries, and veins, both ſanguiferous and lymphatic. The nerves called Diaphragmatic riſe from the third and fourth cervical pairs. The Diaphragm alſo receives ſome branches from the Intercoſtal, and from the eighth pair. Its arteries riſe from the Intercoſtals and the Lumbars; it alſo receives ſome from the Subclavians. We call thoſe ſuperior *diaphragmatic* arteries which are furniſhed to it by the Subclavian, to diſtinguiſh them from thoſe which come to it from the *Cæliac Trunk* and the Lumbars, which are called the *inferior Diaphragmatics*. The ſanguiferous veins accompany the arteries, bear the ſame name, and diſcharge their contents into the trunk

of

of the *Vena Cava inferior*, into the *Azygos*, and the *Subclavian*; all theſe veſſels are alſo called *Phrenic*. As for the lymphatic veins, they generally diſcharge their contents into the *Receptaculum Chili*.

Of Reſpiration.

The lungs are the principal organs of Reſpiration. This function comprehends two motions, namely, inſpiration and expiration; in inſpiration the air enters into the lungs thro' the Trachea Arteria, and in expiration it is diſcharged from them thro' the ſame paſſage. In inſpiration the cavity of the breaſt is augmented by the elevation of the ribs, and the depreſſion of the Diaphragm. The lungs being on this occaſion no longer compreſſed by the ſides of the breaſt, the air included in them is rarified and conſequently its ſpring weaken'd, which permits the external air to enter into the Trachea Arteria, and to inſinuate itſelf into all its Ramifications and Veſicles; and this it does the more eaſily, becauſe the internal air in this ſtate of rarefaction makes but ſmall reſiſtance to it. From what I have ſaid 'tis probable, that the principal cauſe of the entrance of the external air into the lungs, is not ſo much the compreſſion which it receives from the augmentation of the bulk of the breaſt as the force of its own ſpring, which is greater than that of the weaken'd ſpring of the internal air, ſo that we may reſpire an air which is not compreſſed by the augmentation of the bulk of the breaſt. In this caſe the ſame would happen in the breaſt, which would happen in a bellows which had no aperture in its boards. If in a room ſo cloſe that the air it contains had no communication with the external air, we ſhould apply the extremity of the noſel of this bellows to a hole proportioned to it, and which ſhould open without the room, in this caſe the bellows would be filled with the exter-

nal air in proportion as the ſides recede from each other. We may therefore ſay, that as in this caſe the receſſion of the ſides of the bellows is not the cauſe of the entrance of the air, into its cavity; ſo the augmentation of the capacity of the Breaſt is not the cauſe of the entry of the air into the Lungs, but only a condition neceſſary for entering into them.

In expiration the cavity of the Breaſt is diminiſhed by the depreſſion of the ribs, and the elevation of the Diaphragm; the air is in this caſe diſcharged from the Lungs, as well by the approach of the ſides of the Breaſt, as by the action of the elaſtic fibres which enter their compoſition.

The air having enter'd the *Trachea Arteria*, inſinuates itſelf into the *Bronchia*, and arriving at laſt into the cellules, which I have ſaid compoſe the lobes of the lungs, it acts upon the blood contained in the veſſels which run upon the ſides of theſe cellules, and by its action divides it and attenuates its groſs parts, which it does either by itſelf or by means of the fine particles of which it is the vehicle. But beſides this diviſion of the groſs parts of the blood, Mr. *Helvetius* adds, that the air condenſes this too rarified liquor, that is to ſay, brings its divided parts nearer each other, ſo that the blood takes up leſs ſpace when it goes out of the lungs, than it did before it received any impreſſion of the air. We ought not therefore, ſays that learn'd phyſician, to be aſtoniſh'd, if the ramifications of the pulmonary Veins are leſs numerous and ſmaller than thoſe of the pulmonary Arteries; ſince the blood which paſſes into the former, being condens'd by the air in inſpiration, does not poſſeſs ſo much ſpace as if it was rarified. Upon the ſame principle we may explain the unequal capacity of the Arteries and Veins diſtributed to all the parts of the body, by affirming that the Arteries have leſs

capacity

capacity and are fewer in number than the Veins, becauſe the blood is condens'd in the Arteries, and that the Veins on the contrary contain more of it, becauſe the blood is rarified in them. The phyſicians, who are of a contrary opinion to that of Mr. *Helvetius*, think, that the air cannot enter into the lungs without dividing and agitating the blood. Thus without having recourſe to its condenſation or rarefaction to account for the circulation of this liquor in its veſſels, tho' of an unequal capacity, they ſay, that the blood flows with greater velocity in the pulmonary Veins, than in the pulmonary Arteries; and that as for the other Arteries of the body, and the Veins which correſpond to them, the blood flows with more rapidity in the Arteries than in the Veins, and that this exceſs of velocity in ſome meaſure ſupplies what is wanting in their capacity. They found their opinion on this principle of Hydroſtatics, that the degree of velocity with which a liquor flows may ſupply the ſmallneſs of their capacity *.

But beſides theſe uſes of reſpiration, we ought to add, *1ſt.* That the blood by its means frees itſelf from a certain quantity of ſeroſity which eſcapes from the Trachea Arteria in expiration. This is what we commonly call the *Breath*, and what I have call'd pulmonary tranſpiration. *2d.* Reſpiration is neceſſary to facilitate the paſſage of the blood thro' the Lungs. It is alſo neceſſary for the expulſion of ſpittle, and the mucoſity collected in the ſinuſes which correſpond in the noſe, to excite the ſenſation of odours, *&c.* Every one knows that in efforts where great ſtrength is requiſite, we ſuſpend reſpiration; and it is even by this ſuſpenſion of reſpiration, in retaining as much air as poſſible

* See the anſwer of Mr. *Helvetius* to Mr. *Michelatti*, printed at *Paris*, 1728.

in the lungs, and by the extreme tenſion of all the organs ſubſervient to reſpiration at that time, that we explain how a man lying on a plank ſupported only at both ends, and having on his breaſt an anvil of ſix hundred pounds weight, ſuffers a bar of iron to be beat out on that anvil by large hammers; as was ſeen ſome years ago at *Paris*. Laſtly, reſpiration is ſubſervient to the modulation of the voice, and the Larynx is thought the particular organ where it is form'd.

The voice is a ſound which a man produces in diſcharging the air in expiration; and as every ſound ſuppoſes a ſpeedy tremulation or undulation of the air excited by an elaſtic body, we ſhall examine what there is in the larynx capable of modifying the parts of the air ſo as to produce a ſound.

The Larynx is principally compoſed of five elaſtic cartilages, which form the beginning of the duct call'd the Trachea Arteria, alſo compoſed of ſeveral cartilages. This duct loſes itſelf by ramifications in the Lungs, and 'tis by its means that the air enters into and comes out of the Lungs. The orifice of this duct, call'd the Glottis, has ſomething ſingular. It is a kind of oblong Fiſſure, not much more than a line in breadth, and about four or five in length. This Fiſſure is capable of contracting or dilating more or leſs; and it is ſurrounded with two pretty ſtrong ligamentary bands, which are very tenſe. This being granted, we eaſily perceive, that in order to form the voice, 'tis neceſſary that the air which returns thro' the *Trachea Arteria*, paſſing thro' the Glottis, which is very narrow in compariſon of the capacity of this duct, ſhakes the elaſtic Fibres of the ligamentous bands which conſtitute the edges of the Glottis; and that the concuſſions or vibrations excited in theſe Fibres by communicating themſelves to the air, produce a ſound call'd the Voice, whoſe tones are varied according

cording as the Glottis is more or leſs contracted. We may add, that the air alſo receives a modification in the ſinuſes of the Larynx, of which the orifices which are cover'd with the two very tenſe ligamentary bands, can alſo contract themſelves more or leſs.

When a ſimple voice or cry is chang'd into an articulate voice, this depends on the modifications which the air, on its coming from the Glottis, receives in paſſing thro' the throat and mouth; and this is done by the organs found there, ſuch as the tongue, the teeth, the lips, *&c.* To which modifications we ought to add thoſe which this ſame air receives in paſſing thro' the different anfractuoſities of the noſe, and the ſinuſes which communicate with it; and for this purpoſe it is neceſſary that the noſtrils ſhould be free, for we obſerve, that if a perſon ſpeaks or ſings, when the noſtrils are ſtopt, the voice is very diſagreeable.

'Tis therefore obvious, from what I have ſaid, that the voice is only form'd in the Larynx, by the modifications which the air on its coming out of the *Trachea Arteria* there receives, on account of the changes happening in the Glottis more or leſs contracted, whether in crying, ſpeaking, or ſinging †.

CHAP. XIV.

Of the Head.

EVERY one knows that the Head is the moſt elevated part of the human body. It includes not only the Brain in general, but alſo the principal organs of the ſenſes.

† See Mr. *Dodart* on the Voice in Memoirs of the Royal Academy of Sciences, 1700, 1707.

The Head is divided into two parts, of which one is call'd the Scalp, and the other the Face. In the former we diſtinguiſh ſeveral regions, the ſuperior of which is call'd *Vertex* or the crown of the Head, the anterior *Sinciput*, the poſterior *Occiput*, and the lateral the *Temples*. It is compoſed of two kinds of parts, ſome containing and others contained. Theſe laſt are the *Brain*, the *Cerebellum*, and the *Medulla Oblongata*, with the veſſels diſtributed thro' it. The containing parts are common and proper. The former are the ſkin and the fat, and the latter are fleſhy, bony and membranous.

The fleſhy parts are the frontal and occipital muſcles, which form a kind of coiff or aponeurotic covering which covers the greateſt part of the Cranium. To theſe muſcles we may add thoſe call'd the Crotaphites. Among the bony parts we comprehend all the pieces of the Cranium; and among the membranous parts the Pericranium, the Dura Mater and the Pia Mater.

The Pericranium is that membrane which immediately covers the external ſurface of the Cranium. It is not different from that call'd the Periоſteum, and is only by Anatomiſts call'd Pericranium from the Cranium which it covers. We obſerve, that at the crotaphite Muſcles, this membrane is divided into two Laminæ, one of which runs above theſe Muſcles, to terminate at the ſuperior part of the Zygoma, and the other below them, ſo as immediately to touch the Cranium.

The Pericranium is ſtrongly adherent to the Cranium, eſpecially at its ſutures, thro' which this membrane furniſhes filaments to the Dura Mater, and terminates anteriorly at the edge of the orbits.

The Pericranium receives a great number of nerves and blood-veſſels. The nerves come to it from the hard part of the ſecond pair, and from the ſecond cervical pair. The Arteries are ramifi-

cations

cations of the external carotid, and the Veins diſcharge themſelves into the Jugulars.

ARTICLE I.

Of the Brain in general.

WE give the general name of *Brain* to the whole maſs, which entirely fills the cavity of the Cranium, and which is cover'd with two membranes call'd the Dura Mater and the Pia Mater. This maſs comprehends the Brain, the Cerebellum, and the Medulla Oblongata. Theſe three parts are joined with each other, and ſituated in ſuch a manner that the Brain covers the Cerebellum and Medulla Oblongata. The bulk of theſe three parts is not the ſame, that of the Brain being much more conſiderable than that of the Cerebellum, and that of the Medulla Oblongata.

This Dura Mater is a pretty thick membrane of a very cloſe texture, which lines the internal ſurface of the Cranium, and is very cloſely adherent to it, not in all its baſe, and in the parts which correſpond to the ſutures, but even in all the reſt of its extent. 'Tis to be obſerv'd, that the adheſions of this membrane to the baſe of the Cranium, and to the parts of the Sutures, are more firm than in the reſt of the Cranium, and eſpecially in children in whom theſe adheſions are much ſtronger than in adults.

In the Dura Mater we are to conſider its compoſition, elongations, foldings, veſſels and ſinuſes.

The Dura Mater is principally compoſed of two Laminæ, whoſe Fibres croſs each other obliquely, and theſe Laminæ are diſtinguiſhed into internal and external.

The elongations of the *Dura Mater* are form'd by the two Laminæ of this membrane. We ob-

ſerve two of them anteriorly, which line the internal ſurface of the orbits to which they adhere inſtead of a Perioſteum, and continuing to the edges of theſe cavities confound themſelves with the Pericranium. Theſe two elongations riſe from the Cranium on each ſide thro' the optic holes, and the ſphenoidal Fiſſures. The third elongation ariſes from the Cranium thro' the great hole of the Occipital, enters into the canal of the Vertebræ, and furniſhes a particular covering, not only to the Marrow included there, but alſo to all the Nerves which riſe from it. Laſtly, the Dura Mater forms as many particular elongations as there are cords of Nerves which ariſe from the Cranium and the ſpinal Duct; and theſe elongations accompany them to their principal diviſions.

As for the foldings of the Dura Mater they are only form'd by the internal Lamina of this membrane. We may count five of them, among which there are two conſiderable, call'd the *Falx* and the *Tent* of the Cerebellum. The Falx every where embraces the Apophyſis of the *Criſta Galli*, continues along the ſagittal Suture, and when arrived about the middle part of the Occipital, it terminates at the middle of the ſecond folding, call'd the *Tent* of the Cerebellum. In this paſſage it ſlips between the right and left parts of the Brain, to ſuſtain both alternately when we lye on the right or left ſide of the Head.

The ſecond folding of the Dura Mater, call'd the *Tent* of the Cerebellum which is conceal'd below, is by its means ſhelter'd from the compreſſion of the Brain, is adherent tranſverſly along the middle part of the Occipital, and anteriorly to the poſterior angle of the ſtony Apophyſis, in advancing even to the poſterior clinoide Apophyſes of the ſphenoide bone. This folding, in the middle of its anterior part, leaves a pretty conſiderable

groove

groove for the paſſage of the *Medulla Oblongata*, which runs to the great hole of the occipital bone.

The third folding adheres along the ſpine of the Occipital, and ſuſtains the lobes of the Cerebellum. The fourth and fifth foldings, which are the ſmalleſt, adhere to the anterior and poſterior clinoide Apophyſes of the Sphenoide, to augment the capacity of the Sella Turcica, over which the pituitary gland is lodg'd, and to ſcreen this gland from the compreſſion which it might have receiv'd from the Brain.

The veſſels of the Dura Mater are its nerves, arteries and Veins, to which we ought to add its Sinuſes. The nerves are few in number, ſince it only ſeems to receive ſome filaments from the fifth, and ſome from the eighth pair. The arteries are principally furniſh'd to it by the external carotid. The internal carotid, and the vertebral, alſo ſend it ſome ramifications.

The external carotid furniſhes it on each ſide with a branch call'd the Artery of the Dura Mater, which enters the Cranium thro' a hole of the ſphenoide bone, call'd the *Parvum Rotundum*, divides itſelf afterwards into ſeveral branches which run along the external ſurface of the Dura Mater, and are diſtributed thro' all the extent of that membrane. The other branches which the Dura Mater receives from the carotid, enter into the Cranium in different parts. Some paſs thro' the internal orbitary holes, thro' the parietal holes, and others thro' the maſtoideans, *&c.*

All the ramifications of the Arteries diſtributed to the Dura Mater, are accompanied with as many veins, and there are even generally two veins for one ramification of the Artery. The veins diſcharge themſelves into the ſinuſes of the Dura Mater, into the jugular Veins, and into the Vertebrals, and

and moſt of them come from the Cranium thro' the ſame apertures by which the arteries enter'd.

'Tis with difficulty we diſcover the veins, becauſe they are partly conceal'd by the arteries which run over them.

As for the ſinuſes of the Dura Mater they are cavities form'd in the thickneſs of this membrane. The Antients only acknowledged four of them, namely, one longitudinal, two lateral, and a fourth which they call'd right.

The longitudinal ſinus runs all along the ſuperior part of the falx, and ſeems to derive its origin from the hole immediately above the apophyſis, call'd *Criſta Galli*, and continuing along the ſpine of the coronal, and the ſagittal ſuture, terminates at the middle part of the Occipital where the laterals begin, into which it diſcharges itſelf. The lateral ſinuſes begin at the end of the longitudinal, continue to the right and left in the grooves of the Occipital, and terminate in the internal jugular veins.

Mr. *Morgagni* has obſerved, that the longitudinal ſinus does not always diſcharge itſelf into the two lateral ſinuſes at the ſame time, but moſt frequently into the right lateral ſinus.

The fourth ſinus has been call'd * *Torcular Herophili.* It is the ſhorteſt of the four, runs along the joining of the falx with the ſecond folding, and reaches to the end of the longitudinal ſinus.

Beſides theſe ſinuſes the Moderns have diſcover'd ſeveral others, to which they have given various names according to their different ſituations. The firſt is obſervable all along the inferior part of the falx, is call'd the inferior longitudinal ſinus, and terminates in the right ſinus.

The other ſinuſes are principally obſerv'd at the baſis of the Cranium; the firſt, and at the ſame time the moſt conſiderable, are placed immediately at

* See *Ridley*'s Anatom. Cerebr. 1. fig. 4.

the

the ſides of the *Sella Sphenoidis*; they are call'd ſpenoidal Receptacles, or cavernous Sinuſes, becauſe we there diſcover a ſpongeous or cavernous ſubſtance full of blood, almoſt like that of the ſpleen. We alſo find ſeveral nerves in it, the third, fourth, fifth and the ſixth pair; and laſtly, the beginning of each intercoſtal Nerve, with the trunk of each internal carotid Artery. Theſe common receptacles communicate with each other, by means of two ſinuſes call'd the circular Sinuſes of the Foſſa Pituitaria, and which are diſtinguiſhed into ſuperior and inferior.

There are alſo three other pair of ſinuſes which communicate with the ſphenoidal receptacles, namely, the two ophthalmic, and thoſe of the ſtony apophyſis. The ophthalmic ſinuſes alſo communicate with the angular vein.

The ſinuſes of the ſtony apophyſis are two on each ſide, diſtinguiſhed into ſuperior and inferior. The firſt runs along the poſterior and ſuperior angle of this apophyſis, and terminates in the middle of the laterals. The ſecond correſponds to this ſort of furrow, form'd by the joining of the ſtony apophyſis with the anterior prominence of the Occipital and the body of the ſphenoide, and terminates at the end of the laterals. Theſe two ſinuſes communicate with each other, by one and ſometimes two other ſinuſes, which run tranſverſly from the one to the other.

There is alſo a ſinus in the partition of the Dura Mater, which ſeparates the lobes of the Cerebellum. This ſinus, in its ſuperior part, communicates by two branches with the laterals; and in its inferior part this ſinus is divided into four branches, two of which terminate at the end of the laterals, and the other two in the vertebral veins. The cavity of ſome of thoſe ſinuſes is croſſed by ſeveral pretty ſtrong filaments which adhere to the ſides of theſe ſinuſes.

In

In many ſubjects, eſpecially thoſe who have died of long diſeaſes, we find all along the three firſt ſinuſes, and eſpecially the ſuperior longitudinal, ſeveral grains which appear glandular, and which *Pacchioni* has taken for conglobate glands; they are ſituated in the thickneſs of the ſides of the ſinus, and ſometimes even advance into that cavity.

'Tis to be obſerv'd, that the direction of the veins which opens into the ſinuſes is not the ſame. Moſt of them open from behind forward, and ſome of them open from before backwards.

Some have imagin'd, that ſome branches of the arteries of the Dura Mater terminated immediately in the ſinuſes; but the modern Anatomiſts have diſcover'd the falſhood of this opinion.

The ſinuſes diſcharge the blood they contain, not only into the internal, but alſo into the external jugular veins, as well as into the vertebral veins, and the ſinuſes of the Medulla Spinalis call'd the vertebral ſinuſes. To comprehend this, we need only advert, 1*ſt*. That the lateral ſinuſes, with which all the others communicate, diſcharge themſelves immediately into the internal jugulars. 2*d*. That moſt of the external veins of the Head, which diſcharge their contents into the external jugulars, communicate with thoſe ſinuſes; ſuch are the angular veins, thoſe which paſs thro' the parietal and maſtoidean holes, as well as the vertebral veins which paſs thro' the poſterior condyloidean holes; and laſtly, the vertebral ſinuſes which paſs thro' the great occipital hole.

The Pia Mater is a very fine and ſlender membrane, and yet of a pretty firm texture, which immediately covers the Brain, Cerebellum and Medulla Oblongata, as well as that which is included in the ſpinal duct, and at the ſame time furniſhes a particular ſheath for all the filaments which compoſe each nerve. It is interſpers'd with a great

number

number of blood-veſſels, which ſo cloſely unite this membrane to the ſubſtance of the Brain, Cerebellum, and Medulla Oblongata, that it is difficult to ſeparate them in a ſound ſtate.

The *Pia Mater* is compoſed of two Laminæ, between which thoſe veſſels run, with which it is interſpers'd. The internal Lamina of the Pia Mater forms a great many foldings, which inſinuate themſelves into all the furrows obſervable in the ſurface of the Brain and Cerebellum.

The arteries and veins of this membrane are the ſame with thoſe diſtributed to the Brain, Cerebellum and Medulla Oblongata. We have not as yet diſcover'd nerves in this membrane, and it is only joined to the Dura Mater by the veins which diſcharge themſelves in the ſinuſes.

Several celebrated Anatomiſts admit a third membrane of the Brain, which they ſay is ſituated betwixt the *Pia* and the *Dura Mater*. On account of its thinneſs it is call'd *Arachnoides*. But it is found that this membrane is only the external Lamina of the Pia Mater ſeparated from the internal. It is only for the moſt part diſcover'd on the Medulla Oblongata and the Medulla Spinalis.

There are four conſiderable arteries diſtributed to the Brain generally taken, of which there are two anterior call'd *Carotids*, and two poſterior call'd Vertebral Arteries. Theſe laſt enter the Cranium thro' the great occipital hole, and the firſt enter into it ſeparately by an oblique duct form'd in each temporal bone. Theſe veſſels communicate with each other in the Cranium, and before they enter it. They are twiſted differently, as I ſhall obſerve in the angiology in deſcribing them.

ARTICLE

ARTICLE II.

Of the Brain in particular.

THE Brain conſider'd by its ſuperior part nearly repreſents a round or ſpherical body, for which reaſon the two parts which ſeparate it according to its length, are call'd the Hemiſpheres of the Brain, tho', ſtrictly ſpeaking, each of theſe parts only repreſents a quarter of a ſphere. The inferior portion or baſe of the Brain is at it were divided into ſix lobes, diſtinguiſh'd into anterior, middle and poſterior.

In the Brain we diſtinguiſh two ſubſtances, one external and the other internal. The firſt is call'd cineritious or *cortical*, and the ſecond white or *medullary*. Moſt modern Anatomiſts look upon the cortical ſubſtance as the ſecretory organ of a ſpirituous fluid call'd the *Animal Spirits*; and the medullary ſubſtance as an aſſemblage of very fine ducts which receive this fluid in proportion as it is ſeparated by the cortical ſubſtance.

On the ſurface of the cortical ſubſtance we obſerve ſeveral furrows, whoſe irregular directions nearly imitate the circumvolutions of the ſmall inteſtines. Theſe furrows are call'd the *Anfractuoſities* of the Brain. Beſides theſe, we obſerve on each ſide a pretty conſiderable ſciſſure, which ſeparates the anterior from the middle lobes of the Brain. This is call'd the great ſciſſure of *Silvius*.

In ſeparating the two hemiſpheres of the Brain a little we obſerve a whitiſh body, which is only the medullary ſubſtance, but in this part call'd *Corpus Calloſum* from its conſiſtence, which is ſomewhat firmer than in the reſt of the Brain. It ſeems to be compoſed of ſeveral filaments which run tranſverſly from one hemiſphere to the other; and there runs along its middle a kind of ſuture form'd of two ſmall

white cords. Laſtly, the Corpus Calloſum is continued with the *Oval Center*, for this is the name given to that portion of the medullary ſubſtance which diſcovers itſelf, after having horizontally cut the whole extent of the two hemiſpheres almoſt on a level with the *Corpus Calloſum*, which ſubſtance compoſes the upper part, not to ſay the greateſt extent of the ſides of the ſuperior Ventricles of the brain.

The Ventricles commonly called ſuperior, are two cavities formed in the ſubſtance of the brain: they are from their ſituation diſtinguiſhed into right and left, and they generally poſſeſs the whole extent of the hemiſpheres of the brain. Each of theſe Ventricles repreſents a kind of horſhoe, whoſe ends are turned towards the anterior part of the Cranium. In the poſterior part of each of theſe Ventricles we diſcover the mouth of a blind duct, about an inch in length.

Theſe Ventricles are ſeparated from each other by a very thin and tranſparent partition, called the *Septum Lucidum*. At the ſuperior part it is adherent all along the *Corpus Calloſum*, and below to the anterior pillar of the arch with three pillars. This partition is compoſed of two very thin Laminæ, which leave between them a cavity which has no communication with the Ventricles. It is for the moſt part full of Seroſity.

The *Corpus Calloſum* being removed, we diſcover the arch with three pillars called the *Fornix*, and a portion of the *Plexus Choroides*. Of theſe three pillars, there are two poſterior and one anterior; this laſt is placed in the middle between the Ventricles, below the *Corpus Calloſum*. The beginning of this pillar is as it were ſuſtain'd by two white cords, called the roots of the arch, between which we obſerve a third cord which runs tranſverſely from the one to the other. The poſterior pillars are only

the

the diviſion of the anterior; they cover the beds of the optic nerves, and terminate in the poſterior part of theſe eminences.

The arch is only fixed to the adjacent parts by the extremities of its pillars, and by the ſuperior portion of its anterior pillar. All its inferior ſurface is only laid over the adjacent parts, ſo that the Seroſities contained in the right or left Ventricle can paſs from the one to the other, by ſlipping under the anterior pillar.

The *Plexus Choroides* is a congeries of a great number of arteries and veins diſtributed over a very ſlender membrane, in which we ſometimes obſerve ſeveral glandular granulations, which furniſhes the Seroſity which moiſtens the internal ſides of theſe Ventricles. The veins of the *Plexus Choroides* diſcharge themſelves into the right Sinus.

The *Plexus Choroides* being removed, we perceive ſeveral eminences and cavities in the Ventricles; the firſt eminences, and at the ſame time the moſt conſiderable for their bulk, are called the channel'd body and the beds of the optic nerves.

The external ſubſtance of the channel'd bodies is greyiſh, and the internal is divided into ſeveral white ſtreaks, between which the cineritious or corneal part inſinuates itſelf. 'Tis on account of theſe white rays that theſe eminences are called *Corpora Strata*, from the reſemblance theſe rays bear to the grooves formed in moſt pillars.

The eminences called the beds of the optic nerves are nearly of an oval figure, their external ſubſtance is white, and their internal greyiſh. They are joined to each other in all their length by their lateral and ſuperior portion, but are ſeparate in all the reſt of their extent. The ſpace in form of a canal which they leave between them, is called the third Ventricle. Over the ſurface of the beds of the optic nerves there ariſes a ſmall eminence of an oval

figure, and whoſe ſubſtance is the ſame with that of the beds of the Optic Nerves.

Behind the beds of the Optic Nerves we find two other pairs of eminences, called the *Nates* and the *Teſtes:* the nates are the moſt anterior, and are two round bodies, furniſhed with ſeveral ſanguiferous veſſels. The eminences called *Teſtes* are plac'd behind the *Natet.*

Between the beds of the Optic Nerves and the *Nates*, we find a gland called the *Pineal* Gland. It adheres before by means of a ſmall tranſverſe cord, which paſſes from one bed of the Optic Nerves to the other.

The entry of the third Ventricle forms a kind of oval fiſſure formerly called the *Vulva*, but now with more reaſon called the common anterior aperture, becauſe it communicates with the two former Ventricles; and towards the poſterior part we diſcover a ſecond aperture, commonly called the Anus. This is the orifice of a duct called the Aqueduct of *Sylvius*, which correſponds with a fourth Ventricle placed under the Cerebellum, and of which it receives the redundant Seroſities to tranſmit them to the third, which afterwards diſcharges them, as well as thoſe it receives from the former two Ventricles, into a gland called the *Pituitary* Gland placed in the Sphenoidal Foſſa, and that of the Sella Turcica. This diſcharge is made by means of a duct, from its figure called the Funnel, and in latin *Infundibulum*, which joins by its largeſt portion with the anterior and inferior part of the third Ventricle, and terminates by its oppoſite extremity at the Pituitary Gland, which ſome from its uſe call *Abſorbent*, and which tranſmits theſe redundant Seroſities into the internal jugular veins, by means of the Sphenoidal receptacles placed hard by, as alſo by means of the Sinuſes in the baſe of the Cranium.

ARTICLE III.

Of the Cerebellum.

THE Cerebellum is ſituated below the poſterior Lobes of the Brain, from which it is ſeparated by a partition, called the Tent of the Cerebellum. Its figure is almoſt round, being ſomewhat flat above, and in its poſterior parts divided into two Lobes.

The Cerebellum is compoſed, as well as the Brain, of two ſubſtances, one cineritious or cortical, and the other white or medullary.

The furrows obſervable on the external ſurface, which are even pretty deep, are not anfractious as in the brain, but parallel with each other, and continue from one ſide of the Cerebellum to the other, ſo that it is externally divided into ſeveral Laminæ, applied over each other almoſt like the leaves of a fan.

In the anterior as well as poſterior part of the Cerebellum, we obſerve two eminences called vermicular from their figure, and which from their ſituation are diſtinguiſhed into anterior and poſterior.

The Pia Mater performs the ſame office to the Laminæ of the Cerebellum, that it does to the Anfractuoſities of the brain.

The Cerebellum being opened longitudinally, we obſerve that its whitiſh ſubſtance repreſents on each ſide a kind of tree, by ſome called the Tree of Life. The trunk of this tree, commonly called *Pedunculus Cerebelli*, ſeems to produce three pairs of eminences by the unfolding of its fibres, namely, one anterior which unites with the *Teſtes*, one middle which goes to the annular eminence, and one poſterior which runs to the *Medulla Spinalis*.

At the aperture of the Cerebellum we alſo obſerve a fourth Ventricle, whoſe end is called *Calamus Scriptorius*. This cavity is covered before with a medullary expanſion called the *Valve* of *Vieuſſen*, under which we ſee the poſterior orifice of the Aqueduct of *Sylvius*.

ARTICLE IV.

Of the Medulla Oblongata.

THE third part of the Brain generally taken, is the Medulla Oblongata: it is ſituated below the Brain and Cerebellum, with which it communicates by four large parcels of white fibres, which ſeem to be the reunion of all thoſe which enter their compoſition.

Along the inferior part of the Medulla Oblongata we are to conſider five eminences, as alſo the origin of five pair of nerves. The moſt conſiderable of theſe eminences is called *Annular*, and by ſome *Pons Varolij*. The ſecond and third are called *Pyramidales*, and the laſt *Olivares*. Before the annular eminence we alſo ſee two ſmall, white, round bodies, and a portion of the *Infundibulum*, which, as I have before obſerved, terminates at the pituitary gland. And immediately beyond theſe eminences, the Medulla Oblongata ſeems as it were to divide itſelf into two lateral portions, by means of two pretty deep grooves obſervable there, and of which the one is in the anterior or inferior part of the Medulla Oblongata, and the other in its poſterior or ſuperior part. If we gently ſeparate the ſides of theſe grooves or fiſſures, we diſcover an interlacement croſſed with ſeveral medullary cords, which paſs obliquely from one ſide to the other. This is a diſcovery of Mr. *Petit*'s, Phyſician, and member of the royal academy of ſciences, by means of which we explain why the Palſey, which happens in conſe-

quence of ſome diſorder of the brain, attacks the members of the body, ſituated on the oppoſite ſide to the portion of the brain which is affected.

The pituitary gland appears under the form of a ſmall body, whoſe figure and bulk reſemble thoſe of a French-bean. Its ſubſtance is ſpongeous, and its ſituation over the *Sella Sphenoidalis*, betwixt the two Laminæ of the Dura Mater, the external Lamina forming a receptacle for this gland, and the internal covering it above. This laſt is perforated oppoſite to the middle of this gland with a ſmall hole, for the paſſage of the Infundibulum. There is alſo, for the ſame uſe, a ſmall aperture in the proper membrane of this gland. 'Tis thro' this duct that this gland continually receives the Seroſities which have been furniſhed in the Ventricles by the *Plexus Choroideus*, and it afterwards diſcharges them into the Sphenoidal receptacles, where mixing with the blood there, they are again reſorb'd by the correſponding Sinuſes, which convey it into the internal jugular veins.

It is principally on the Medulla Oblongata that we diſcover the *Membrana Arachnoides*, which has no ſanguiferous veſſels, and which only ſeems to be the external Lamina of the Pia Mater.

The Medulla Oblongata, and that included in the ſpinal duct, afford an origin to ſeveral nerves which are diſtinguiſhed into pairs, of which we count ten for the Medulla Oblongata, and thirty for the Medulla Spinalis.

The firſt pair of nerves belonging to the Medulla Oblongata is that of the *Olfactories*, which riſe from the anterior and inferior part of the channel'd bodies, and diſtribute themſelves on the internal membrane of the noſe, paſſing thro' the holes of the *Lamina Cribriformis* of the *Os Ethmoides*.

The ſecond is the *Par Opticum*, which ſeem to derive their origin from the eminences called *Thalami*

lami Nervorum Opticorum, and loſe themſelves in the eye, paſſing thro' the *Foramina Optica*, and by their ſpreading form the membrane called the *Retina*.

The third is that of the *Motores Oculorum*, which ariſe from the anterior part of the annular eminence, and loſe themſelves in the muſcles of the eye and eye-brow.

The fourth is the *Par Patheticum*, whoſe nerves ariſe behind the eminences called the heads, and loſe themſelves in the muſcle of the eye called *Obliquus Major*.

Theſe two pairs, as well as the branch of the fifth, which I ſhall call *Ophthalmic*, riſe from the Cranium thro' the Sphenoidal Fiſſures.

The fifth pair riſes anteriorly from the *Medulla Oblongata*, and is diſtributed to the eye and the upper and inferior jaw, dividing itſelf into three branches called the Ophthalmic, the ſuperior Maxillary, and the inferior Maxillary.

The ſixth pair riſes poſteriorly from the annular eminence, and loſes itſelf in the Abductor muſcle of the eye, paſſing thro' the Sphenoidal Fiſſure.

The ſeventh, commonly called *Par Auditorium*, riſes from the lateral parts of the annular eminence. It has two portions, one ſoft, which loſes itſelf in the internal part of the ear, and one hard, which is diſtributed to the external part of the ear and to the face.

The eighth, called the *Par Vagum*, riſes from the *Corpora Olivaria*, and is diſtributed to the Œſophagus, to the Trachea Arteria, the lungs, and the ſtomach, *&c.* it comes thro' the *Foramina Lacerata poſteriora*.

The ninth pair ariſe between the *Corpora Pyramidalia* and *Olivaria*, and are principally diſtributed to the tongue.

The tenth pair riſe behind the *Corpora Olivaria*, and loſe themſelves in the ſmall extenſor muſcles of the head.

On the *Medulla Oblongata* we alſo ſee the communication of the Carotid with the vertebral arteries and their different ramifications, as well upon the brain as upon the Cerebellum and Medulla Oblongata.

The Medulla Spinalis, which is only a continuation of the Medulla Oblongata, alſo appears compoſed of two ſubſtances, the external of which is white and the internal cineritious. It is covered with four coats, the firſt of which is very thick, and adheres to the internal ſurface of the vertebral canal; the ſecond is a continuation of the Dura Mater, and between theſe two coats we find a pinguious ſubſtance; the third coat is called *Arachnoides*, and the fourth is the Pia Mater, which immediately covers the Medulla Spinalis.

Along the anterior and poſterior part of the Medulla Spinalis we obſerve a Fiſſure, which only penetrates to its cineritious portion, and into which the Pia Mater inſinuates itſelf.

The Medulla Spinalis is not equally large in all its extent, ſince its bulk is moſt conſiderable at the under part of the neck and of the back; and we obſerve, that it deſcends no lower than the ſecond Vertebra of the loins, where it terminates in a kind of cone, from the circumference of which thoſe nerves ariſe which run to the inferior parts.

The nerves furniſhed to the Medulla Spinalis riſe thro' two plans of fibres, one of which is anterior and the other poſterior. Theſe two plans unite in the part where they pierce the Dura Mater, and where the nervous cord begins. Theſe nerves are diſtinguiſhed into pairs, of which we count thirty. The ſeven firſt or ſuperior are called *Cervical*,

vical, the twelve ſucceeding *Dorſal*, the five following *Lumbar*, and the ſix laſt *Sacred*. To theſe thirty pair we ought to add the two nerves, called the *Socij Octavi Paris*.

The Medulla Spinalis receives its arteries from the Vertebrals, the Intercoſtals, and the Lumbars. The different branches furniſhed by theſe arteries form two principal trunks, called the Spinal Arteries, which extend along the Medulla Spinalis, the one being ſituated before and the other behind. Its veins diſcharge themſelves into the vertebral Sinuſes which run along the Medulla, being placed laterally between the Dura Mater and the ligamentary membrane which immediately covers the canal. Theſe Sinuſes are properly no more than two trunks of veins, which communicate with the Vertebrals, the Intercoſtals, and the Lumbars.

ARTICLE V.

Of the Uſe of the Brain.

THO' 'tis true that nothing certain can be affirmed concerning the Uſe of the different parts which compoſe the Brain, yet it muſt be granted that this organ has ſo great a ſhare in the functions of all the other parts of the body, that it is juſtly called the Organ of all the reſt, or the *Primum Mobile* of the whole animal Œconomy: We ought not therefore to be aſtoniſhed, if the Author of nature has ſo carefully defended it againſt the noxious impreſſions of external bodies: in a word, beſides that it is included in an oſſeous box, whoſe particular ſtructure defends it againſt theſe impreſſions, it is alſo covered with two membranes. The firſt, which is the Dura Mater, not only defends the brain from the hardneſs and inequalities of the Cranium, but is alſo of great uſe by the partitions

which it forms; for the anterior, as I have ſaid, hinders one of the hemiſpheres of the brain from preſſing upon another when the head is turned to one ſide, and the poſterior defends the Cerebellum from the weight of the poſterior Lobes of the brain. As for the Sinuſes obſerved in the thickneſs of this membrane, their uſe is not confined to render the circulation of the blood more free in the head, but by their ſeveral contorſions they alſo hinder this liquor from returning to the heart with too much rapidity. I ſay nothing of the motions attributed to the Dura Mater by celebrated authors, becauſe as it is cloſely adherent to the Cranium it does not ſeem capable of moving, eſpecially as we neither diſcover in it either fleſhy fibres or a ſufficient number of arteries to communicate theſe motions to it. 'Tis true, that when it is laid bare we ſee it elevate and depreſs itſelf; but theſe motions by no means belong to it, for at that time it only follows the motions of the Diaſtole and Syſtole of the brain, which are communicated to it by the great number of arteries diſtributed to it.

As for the Pia Mater, it ſeems that the great number of partitions which it forms, is neceſſary as a ſupport to the ſanguiferous veſſels which penetrate the ſoft ſubſtance of the brain, and which are diſtributed to it in a great number, eſpecially to its cineritious ſubſtance, which, as I have ſaid, is by ſeveral great anatomiſts looked upon as the ſecretory organ of the animal ſpirits, which afterwards paſs into its white or medullary ſubſtance, formed by the union of the excretory glands of the cineritious ſubſtance to be diſtributed thro' the nerves in all the parts of the body.

It is aſked, whether the medullary fibres which riſe from the glands of the cineritious ſubſtance of the brain continue diſtinct, and without their cavities communicating with the adjacent fibres,

from

from their origin to the place where the nerves begin? or whether theſe fibres communicate with them, by forming in their courſe a common receptacle in form of a ſpongeous body, where they terminate in order to diſcharge the ſpirits which they have received from the glands, and from which common receptacle, by ſome called *Emporium*, thoſe filaments ariſe which compoſe the nerves, ſo that according to this opinion the animal ſpirits which come from the right ſide of the brain communicate with thoſe which come from the left? The delicacy of the fibres which compoſe the medullary ſubſtance of the brain not permitting us to follow them in their courſe, we are obliged to have recourſe to ſome experiments, which may favour the one or the other of theſe opinions. Two experiments ſeem to favour the opinion of thoſe who admit a common receptacle for the animal ſpirits.

The firſt of theſe experiments has been made on a dog, by taking away a conſiderable portion of the cineritious part of the brain, notwithſtanding which he retains the motion of all the parts of the body. The ſecond experiment is founded on caſes of perſons who have been wounded in the head, and in whom a part of the brain has been removed, without their being attacked with a palſey in any part of the body.

In my opinion, we cannot well explain theſe phenomena without admitting a common receptacle; for in the extirpation of this conſiderable portion of the brain, a great number of glands being deſtroyed, all the nervous fibres which riſe from them muſt want ſpirits, and conſequently deprive thoſe parts of them to which theſe nervous filaments are diſtributed, which muſt neceſſarily produce a loſs of motion in thoſe parts. But as the motion is retain'd in all the parts of the body, we may reaſonably conclude that the ſpirits which have not ceaſed to

flow into all the parts, not coming from the glands which have been moved, muſt neceſſarily proceed from a common receptacle, unleſs we aſſert that the ſame part of the body receiving its nervous fibres from different parts of the brain, may retain its action tho' ſome of theſe fibres ceaſe to furniſh it with ſpirits, the others being able to ſupply their defect. But we anſwer, that each of the fleſhy fibres which compoſe the body of a muſcle ſeparately receiving its nervous filaments, the whole muſcle cannot retain its action, ſince this action muſt neceſſarily be loſt in the fleſhy fibres which correſpond to the removed glands.

The abettors of this opinion affirm, that this receptacle and the nerves are always full of animal ſpirits, and that they flow from them continually into all the parts of the body, ſince new ſpirits are conſtantly ſeparated to ſupply thoſe ſent from the receptacle and the nerves. Thus this diſcharge of ſpirits is never finiſhed during life, but is a perpetual ſource which is never exhauſted, and which affords its ſupplies unequally, according to the diſpoſition of the blood and organs; and tho' the animal ſpirits flow continually into our organs, becauſe they are propelled into them by thoſe filtrated in the glands, yet the leaſt cauſe is ſufficient to interrupt their courſe and repel them to the brain, the force which obliges them to deſcend being very weak, and conſequently eaſily ſurmounted by the impreſſions which objects make on our organs. But in proportion as the animal ſpirits are repelled to the brain, they agitate its fibres by a neceſſary mechaniſm, and excite in us the ſenſations of pain and pleaſure, and all the ideas imprinted in our minds by the preſence of objects, becauſe it appears that the very principle of our ſenſations depends on the agitation of theſe fibres.

Of the Senſations.

As 'tis by means of the nerves that the impreſſions of objects are tranſmitted to the ſeat of the ſoul, 'tis to be obſerved, that the nerves may be agitated either in their origin, that is to ſay, at their beginning or at their extremities, or in the portion between their origin and extremities. If the nerves are agitated at their origin by the agitation of the animal ſpirits, the impreſſion conveyed to the ſoul is called *Image* or *Idea*. If the agitation is made in their middle portion or at their extremities, and communicated to the brain, the impreſſions which the ſoul then receives is called *Senſation*; this ſenſation will be either painful or agreeable, according as the agitations which the nerves receive from objects are gentle or violent; for it is probable, that the cauſe which produces pain does not differ, but in degrees, from that which produces pleaſure.

'Tis to be obſerved, that there are organs which receive the impreſſion of certain objects, on which occaſion the ſoul has a particular ſenſation, while the other organs, tho' expoſed to the impreſſions of theſe ſame objects, are not however agitated by them. The organs which are agitated by theſe particular objects are called the organs of the ſenſes, of which we reckon five, namely, the ſkin, the noſe, the tongue, the eye, and the ear: in a word, 'tis only the ſkin that is capable of exciting in us the ſenſation of the tactile qualities of bodies, that is to ſay, which enables us to perceive diſtinctly whether the bodies which we touch have ſmooth or rough ſurfaces, *&c.*

The noſe is the only organ by which we can have the ſenſation of ſmells, the tongue and palate that of taſtes, the eye that of light and colours, and the ear that of ſound.

Of

Of theſe organs there are ſome in which 'tis neceſſary, that the object intended to excite the ſenſation muſt be immediately applied to the organ. There are others which are agitated, tho' the object intended to excite the ſenſation is at a diſtance from the organ. To perceive, for inſtance, by the touch the ſmoothneſs or inequalities of a body, 'tis neceſſary that the object be applied to the ſkin. We may ſay the ſame of taſte, with reſpect to the tongue and palate. But in order to ſee luminous and coloured objects, and to hear ſounds, the agitation neceſſary to excite theſe ſenſations cannot be produced without the aſſiſtance of ſome intermediate ſubſtance, as the air, *&c.* which is placed between the organ and the object.

When in conſequence of an impreſſion made upon ſome organ of the body, a ſenſation is excited in our ſoul, there are four things which we generally confound, but which however it is of great importance to diſtinguiſh, 1*ſt*, the action of the object to which we refer the ſenſation, for example, the puncture of the ſkin by a pin, *&c.* 2*d.* the agitation which the nervous fibres have received from that object; 3*d*, the perception which is excited in the ſoul by this agitation, or the ſenſation itſelf: 4*th*, the judgment, which we may call natural, by which the ſoul attributes this ſenſation to the part pricked, tho' 'tis certain that this ſenſation is only in the ſoul.

ARTICLE VI.

Of the Organ of Touch.

THE face is the ſeat of the principal organs of the ſenſes. That of the touch is the moſt extenſive of them all, ſince the ſkin is the organ of this ſenſation. We are to diſtinguiſh two kinds of *Touches*, one called *Univerſal*, becauſe its organ is in all

all the parts to which the nerves are diſtributed, and becauſe 'tis by its means that the other ſenſes receive their impreſſions: this is generally called *Feeling*. The ſecond is called the *particular Touch*, becauſe its organ is confined to the Papillæ of the ſkin, and this is alſo called the *Touch*.

The *univerſal Touch* only gives us a looſe idea of the tactile qualities of bodies, enabling us only to diſtinguiſh their bulk, heat, coldneſs, *&c.*

The *particular Touch* enables us to perceive the different tactile qualities of bodies, ſuch as their figure, roughneſs, ſmoothneſs, *&c.* more or leſs diſtinctly, according as the Papillæ of the ſkin are more or leſs diſpoſed to be agitated.

But tho' we may juſtly ſay that the Papillæ of the ſkin are the immediate organ of the *particular Touch*, yet as this *Touch* is principally excited by the agitations which the Papillæ of the ſkin which covers the ends of the fingers receive, 'tis probable that this ſenſation principally depends on the agitations of theſe Papillæ. The reader may conſult what I have ſaid of the ſkin, in ſpeaking of the Teguments.

ARTICLE VII.

Of the Organ of Taſte.

THE tongue is looked upon as the principal organ of the ſenſation of taſte. It is a fleſhy body, capable of a vaſt variety of motions, ſituated in the cavity of the mouth in the interſtice of the teeth which are fixed in the inferior jaw, extending farther backwards, where this organ is thicker and broader, whence its poſterior part is called its baſis, which is cloſely adherent to the Os Hyoides, as alſo to the Larynx and Pharynx. The tongue is adherent before along its inferior part by a membranous ligament

ligament called the Bridle, which is only a continuation of the membrane which covers the internal part of the mouth and the tongue. Laſtly, the tongue is adherent to the inferior jaw, to the Os Hyoides, and to the Styloide apophyſes of the temporal bones, by means of the muſcles deſcribed in the Myology.

The ſuperior ſurface of the tongue is ſomewhat convex and flat: it is equally divided according to its length into two lateral parts, by a line or depreſſion called the *Linea Media.*

The membrane which covers the tongue is interſperſed along its ſuperior ſurface with ſeveral eminences called the Papillæ of the tongue, and which we generally take for the extremities of the nerves diſtributed to that part, tho' ſome of them appear rather glandulous than nervous; ſuch are thoſe which are obſerved at the root of the tongue, and which are moſt conſiderable for their bulk. They are of the figure of ſmall muſhrooms, having a head upon a very ſmall Pedicule, and are as it were nitched in the ſuperficial dimples. The ſecond, which are ſmaller, are ſeveral orbicular eminences, which more or leſs poſſeſs the anterior and middle part of the tongue. The Papillæ of the third kind are the ſmalleſt and moſt numerous; they poſſeſs the whole extent of the ſuperior ſurface of the tongue, and even advance into the interſtices of the other Papillæ.

In ſeveral perſons we alſo find on the ſuperior ſurface of the tongue near its root a blind aperture, which I have ſaid is the rendezvous of ſeveral ſalivary ducts. Mr. *Heiſter* has diſcovered two of theſe ducts, of which he gives us the figures in his anatomy.

The tongue is principally compoſed of very ſoft fleſhy fibres, which are diſtinguiſhed into two kinds. Some are confined to the tongue itſelf, without extending

extending farther, and the others are the continuations of its muſcles: the firſt, which are called the intrinſic muſcles of the tongue, compoſe two particular plans, which run ſuperficially along the ſuperior ſurface of the tongue, and of which one is formed of longitudinal fibres, and the other, which is placed below, is compoſed of tranſverſe fibres, which are partly interlac'd, and terminate by their extremities, ſome at the edges of the tongue, and others at its baſe and point. Of theſe fibres of the tongue ſome make a particular muſcle, which they call *Lingual*, and which concurs with the other muſcles of that organ, to perform all the motions with which it is almoſt continually agitated. The fibres of the tongue, which are continuous to its muſcles, are of three ſorts, ſome longitudinal, ſome tranſverſe, and others vertical. The longitudinal are partly the expanſions of the *Styloglo ſſal*, *Baſioglo ſſal*, and *Genioglo ſſal* muſcles; the tranſverſe ſeem to be produced by the *Myglo ſſals*, and the vertebral are the remainder of the *Genioglo ſſals*.

The veſſels of the tongue are its nerves, arteries, and veins. Its nerves riſe from the ninth pair, and from the third branch of the fifth; its arteries, which are called *Ranine*, are furniſhed to it by the external Carotid; and its veins, which have the ſame name, diſcharge themſelves into the *Jugulars*.

As theſe veſſels accompany each other, we ought to beware of bleeding in this part, for fear of pricking the artery, its aperture producing an Hemorrhage which is difficult to be ſtop'd, and which lately proved fatal to a young gentleman. We may alſo avoid opening theſe veſſels, by cutting the filament.

Beſides that the tongue is the principal organ of taſte, it is alſo ſubſervient to Maſtication, Deglu-

Deglutition, Pronunciation, and the expulſion of ſpittle.

The taſte is a ſenſation excited by the reliſh of the different aliments we uſe. The ſaline parts of aliments are thought the principal cauſe of taſte, and 'tis alſo believed that the Corpuſcles which form theſe ſaline parts being attenuated by the Saliva, and afterwards applied to the organ of taſte, inſinuate themſelves into it, and move it according to the relation they have to it. In this organ we ought to comprehend the Papillæ of the tongue, but eſpecially thoſe of the third kind, which are the ſmalleſt, and which I have ſaid are found on the point of the tongue, and which afterwards ſpread over its extent. 'Tis evident that 'tis on the ſaline parts of aliments that their taſte depends, becauſe we obſerve that there are no ſavoury bodies from which we cannot extract ſalt, and which do not become inſipid as ſoon as this ſalt is obtained, in the ſame manner as there is no inſipid ſubſtance which may not become ſavoury by having ſalt mixed with it. Beſides, we obſerve that nothing becomes capable of being taſted which is not moiſt, becauſe it is neceſſary the parts of the ſalts ſhould be ſufficiently attenuated to penetrate to the immediate organ, and there excite an agitation ſufficient to excite the ſenſation. I ſhall not here conſider the different kinds of taſtes, but only obſerve that what ſeems to produce a difference in the taſtes of ſeveral perſons, ariſes principally from the nature of their Saliva, which is more proper in ſome than in others to diſſolve the parts of ſavoury bodies; and the change of taſte which happens in the ſame perſon, appears to be the effect of ſome alteration in the Saliva.

Tho' the tongue be the principal organ of taſte, and is ſubſervient to Maſtication, Deglutition, and Pronunciation, yet theſe functions may be performed without the aſſiſtance of this organ, which is prov'd by

by an obſervation inſerted in the *German* Journals, where 'tis ſaid *, that a child about eight or nine years of age, born at the *lower Poitou*, who in the ſmall pox loſt his tongue, ſpitting it up gradually till no portion of it remained, yet ſpoke, ſpit, chew'd and ſwallow'd his aliments. He had alſo the ſenſe of taſte, diſtinguiſhing different ſavours. But before this obſervation appear'd, *Malpighi*, and ſeveral other Anatomiſts, imagin'd that the palate was not ſubſervient to the taſte, founding their opinion on the diſcovery they had made of the nervous papillæ there. We may be aſſured, that the palate is ſubſervient to the taſte, by applying ſome ſavoury body to it; for we will not fail to diſcover the ſavour of them in proportion as their parts are ſufficiently expanded to make any impreſſion upon it.

ARTICLE VIII.

Of the Noſe.

AUTHORS give different names to the external parts of the Noſe. They call the ſuperior part its root, the inferior its point, the middle its ridge, thoſe which form the edges of the noſtrils its alæ or wings, and that which ſeparates them the pillar or column of the Noſe.

The parts which compoſe the arch of the Noſe, are not only the ſkin and a very ſmall portion of fleſh, but alſo bones, muſcles and cartilages. As for the bones and muſcles they are deſcribed in the Oſteology and Myology.

The cartilages of the Noſe are five in number, four of which form the inferior part of the Noſe, two ſuperior, and two inferior. Theſe laſt principally compoſe the noſtrils. The fifth forms the anterior and middle part of the partition which ſeparates the internal part of the Noſe into two cavi-

* See Mr. *Juſſieu*'s Letter in the Memoirs of the Royal Academy of Sciences for the year 1718.

ties, of which the noſtrils are the entrance. Theſe two cavities are not only form'd by the particular diſpoſition of the two ſuperior bones of the Noſe, and the cartilages I have mentioned, but the maxillary bones united together, and thoſe of the palate alſo, form a conſiderable portion of them. The Os Sphenoides and Ethmoides alſo concur with the Vomer, to the formation of the ſides of the cavities of the Noſe; and the joining of the Ethmoide with the Vomer, forms the bony portion of the partition of the Noſtrils.

We are to conſider ſeveral things in each cavity of the Noſe; in the ſuperior part, we ſee the cellular portion of the Os Ethmoides, and in the inferior the *Corpora Spongioſa*. We alſo there diſcover the mouths of the frontal ſinuſes in the cellules of the Os Ethmoides, that of the maxillary ſinus on each ſide, between the cellular portion of the ethmoide bone, and the inferior laminæ of the Noſe. The mouths of the ſphenoidal ſinuſes appear in the poſterior and inferior part of the Noſe. We, in the Noſe, alſo find the orifices of the lachrymal ducts, and of the inciſories; and laſtly, the communication of the cavities of the Noſe with the Throat.

'Tis to be obſerved, that each cavity of the Noſe is lin'd with a ſpongious membrane call'd the *pituitary* membrane. This membrane alſo covers the cellules of the Os Ethmoides, the ſpongious bones or inferior laminæ of the Noſe, and the internal ſides of the ſinuſes and lachrymal and inciſory ducts; and it is interſperſed in all its extent, with ſeveral glandular granulations which furniſh the mucilaginous humour with which it is continually moiſtened. 'Tis principally on the portion of this membrane which covers the cellules of the ethmoide bone, that the filaments of the firſt pair of nerves expand themſelves, as alſo ſome ramifications of the fifth, which receive the impreſſions of odorous bodies,

bodies, and tranſmit them to the ſoul for the ſenſation of ſmelling.

The arteries diſtributed to the Noſe come to it from the carotids, and the veins diſcharge themſelves into the jugulars.

We here give the name of *Smells* to the particles detach'd from odoriferous bodies to excite the ſenſation of *Smelling*, tho' ſometimes this name is alſo given to the ſenſation which they excite. We muſt imagin theſe particles to be very ſubtile and volatile, ſince in order to excite the ſenſe of ſmelling (that is to ſay, that theſe particles may agitate the nerves diſtributed in the internal part of the Noſe, in ſuch a manner as is proper to excite this ſenſation) it is neceſſary that they ſhould be tranſmitted into this organ, by means of the air introduced thither during inſpiration. 'Tis commonly thought that theſe particles are the ſalts and ſulphureous parts of odoriferous bodies, tho' 'tis alſo granted that among theſe bodies, there are ſome which only excite the ſenſation of ſmelling by a detachment of their integral parts. 'Tis on the difference of the particles, detach'd from odoriferous bodies, that the difference of ſmell depends; and 'tis probable, that what renders theſe odours agreeable, or diſagreeable, is no more than the difference of the agitations excited by theſe particles.

As for the lymphatic humour furniſhed by the glands of the pituitary membrane, it is neceſſary that the organ may be maintain'd in a ſtate proper to be agitated by the corpuſcles of odoriferous bodies, and even to moderate the too great impreſſion of the air which continually paſſes thro' the Noſe.

ARTICLE IX.

Of the Eye.

TO form an idea of the different parts of the Eye, 'tis neceſſary to diſtinguiſh them into thoſe which compoſe its globe, and thoſe which cover it.

Every one knows that the Eye is ſituated in the cavity of the head call'd the orbit, whoſe figure reſembles that of a cone. It is cover'd anteriorly by the Eye-lids, above which we ſee the Eye brows which are form'd of ſeveral hairs placed obliquely: The ſkin which ſupports them appears thicker than that on the reſt of the viſage. The head of the Eye-brows is that portion which is next to the noſe, and their oppoſite extremity is call'd their tail.

The Eye-lids are two elongations of the ſkin, border'd at their extremities with a cartilage call'd the *Tarſus*, and cover'd in all their extent with the muſcles which ſerve to move them. The parts where the Eye-lids unite are call'd the Angles of the Eye. They are alſo call'd Canthuſes, the *Canthus Major* or *internus* is that next the noſe, and the *Canthus Minor* or *externus* is that on the oppoſite ſide.

At the edge of every Eye-lid we find a row of ſmall and pretty ſtiff hairs crook'd in a particular manner, and commonly call'd the Eye-laſhes. In the thickneſs of the tarſal veſſels we find ſeveral ſmall ſebacious glands, whoſe excretory ducts open at the edges of the Eye-lids. Theſe are call'd ciliary glands, or the glands of *Meibomius*.

We generally reckon but two muſcles for the Eye-lids; namely, one to raiſe the ſuperior Eye-lid call'd the *Elevator Proprius*, and one to bring both Eye-lids together call'd the *Orbicularis*.

The elevator has its fix'd adheſion at the bottom of the orbit, and its moveable adheſion at the edge of the orbit; the orbicular muſcle has its fix'd adheſions at all the edges of the orbit, and its moveable adheſions at the two Eye-lids. This muſcle near the great Canthus forms a pretty conſiderable tendon, to the ſection of which ſome have improperly aſcrib'd the inflammation of the Eyes, which ſometimes ſucceeds the operation for the Fiſtula lachrymalis, this inflammation being only produced by the deſtruction of the ſkin which forms the union of the Eye-lids.

The globe of the Eye is join'd to the Eye-lids by a ſlender and tranſparent membrane call'd the *Conjunctive*, and vulgarly the white of the Eye. This membrane adheres by one of its extremities to the circumference of the *Cornea*, and by the other to the edges of the Eye-lids. It alſo adheres in its middle part to the edges of the orbit. It lines the whole internal part of the Eye-lids, and the anterior part of the coat of the Eye call'd the *Cornea Opaca*, which is cover'd, as I ſhall afterwards ſhew, with the aponeuroſes of the muſculi recti of this organ.

Above the globe of the Eye, near the *Canthus Minor*, we find a conglomerate gland call'd Lachrymal, whoſe excretory ducts, having paſſed thro' the conjunctive, diſcharge on the ſurface of the Globe the Lachrymal Lymph, which afterwards paſſes into two apertures which are at the Canthus Major on the edges of the Eye-lids. Theſe apertures, call'd *Lachrymal Points*, correſpond to two ducts which diſcharge themſelves into one which is common to them, and this communicates with a bag call'd the *Lachrymal Sack*, ſituated at the great Canthus of the Eye, in a ſmall foſſa form'd at the edge of the orbit, in the *Os Unguis* and the *Os Maxillare*, and conceal'd in part by the tendon of the *Orbicular Muſcle*. The Lachrymal Sack corre-

ſponds to a membranous duct alſo call'd *Lachrymal*. This duct is lodg'd in the naſal canal, and diſcharges itſelf into the noſe immediately behind the inferior horn or lamina. We obſerve, that the oriſice of this duct towards the noſe is very narrow, and the direction of the duct is oblique running from before backwards.

In the great *Canthus* we alſo find a red body, call'd *Caruncula Lachrymalis*, which is glandular, and furniſhes an humour like that which the ciliary glands ſeparate. In the ſame part we alſo diſcover a ſmall ſemi-lunar folding form'd by the *Conjunctiva*.

Between the orbit and the globe of the Eye we find its muſcles, veſſels, and a quantity of fat. The muſcles of the Eye are diſtinguiſh'd into the recti and obliqui. The recti are divided into elevator, depreſſor, adductor and abductor. The obliqui are divided into major and minor. The recti have their fix'd adheſions at the circumference of the Foramen opticum, and their moveable adheſion at the anterior edge of the *Cornea Opaca*, by flat tendons or aponeuroſes, which unite with each other, and by this means form the aponeurotic membrane which properly conſtitutes the white of the Eye.

The obliquus major has its fix'd adheſion at the bottom of the orbit, afterwards paſſes its tendon thro' a cartilaginous ring call'd *Trochlea*, ſituated near the canthus major at the ſuperior edge of the orbit, and terminates at the poſterior part of the globe. The obliquus minor has its fix'd adheſion at the inferior edge of the orbit, near the canthus major, and its moveable adheſion at the poſterior part of the globe.

The Eye receives its arteries from the carotids, and its veins run to the jugulars. As for the nerves, beſides the ſecond, third, and fourth pairs, which

it

it receives intirely, it alſo receives a portion of the fifth and ſixth.

The globe of the Eye is compoſed of membranes and humours. The membranes are diſtinguiſh'd into common and proper. The common are the *Cornea*, the *Uvea* and the *Retina*. The proper are the *Arachnoidea* and *Vitrea*. The humours are three, namely, the *Aqueous*, the *Cryſtalline* and the *Vitreous*.

The *Cornea* includes all the parts which compoſe the globe of the Eye. This membrane is tranſparent anteriorly and opaque in the reſt of its extent. Its tranſparent portion is call'd *Cornea Tranſparens*, and its opaque portion *Cornea Opaca* or *Sclerotica*.

The ſecond membrane, call'd *Choroides*, is perforated before with a round hole call'd the *Pupil*, whoſe external circumference is of different colours, for which reaſon it is call'd *Iris*. The Pupil is dilated or contracted according to the lightneſs or darkneſs of places, and the nearneſs or diſtance of objects. Theſe motions of dilatation and contraction depend on various fibres found in the internal ſurface of the *Iris*, ſome of which are circular and others longitudinal.

Several Anatomiſts give the name of *Uvea* to this portion of the *Choroides*, and they give the name of Choroides to the reſt of this membrane. In the union of theſe two portions or membranes, we obſerve externally a whitiſh circle about a line and a half broad, which is commonly call'd the *Ligamentum Ciliare*, to which the edge of the *Sclerotica* cloſely adheres at its union with the *Cornea Tranſparens*.

The portion of the Choroides from the *Ligamentum ciliare* to the Optic Nerve, is compoſed of two very fine Laminæ, the internal of which, call'd the membrane of *Ruyſch*, is cover'd with a blackiſh humour. This Lamina arriving oppoſite to the ciliary Ligament, ſeems to form ſeveral radiated

foldings, call'd the ciliary Productions or Proceſſes. Theſe foldings are received into ſo many furrows or grooves, form'd in the anterior part of the *Vitrea* joining the *Cryſtalline*.

The third membrane is call'd the *Retina*, which lines the internal ſurface of the membrane of *Ruyſch*, and advances to the Chryſtalline where it terminates. It appears to be only a whitiſh and almoſt tranſparent matter, nearly reſembling a moiſten'd wafer, but being waſh'd in water it appears to be a very fine web with its veſſels. It is form'd by the expanſion of the Optic Nerve, and moſt phyſicians look upon it as the immediate organ of ſight.

The humours of the Eyes are three; the firſt or anterior is call'd *Aqueous*, which poſſeſſes the ſpace between the *Cornea Tranſparens* and the *Iris*, and that which is ſaid to be found between the poſterior part of the *Iris* and the *Cryſtalline*, which ſpaces are call'd chambers and diſtinguiſhed into anterior and poſterior.

The ſecond humour is call'd *Cryſtalline*, which is ſituated immediately after the aqueous humours, behind the *Iris* and oppoſite to the *Pupil*. Its figure is lenticular, and its conſiſtence is pretty firm: Some Anatomiſts think, that this tranſparent humour is included in a particular covering, call'd *Arachnoide*, but it has been obſerv'd, that the particular ſack which includes the Cryſtalline, is a continuation of the membrane of the *Humor Vitreus*.

The third humour, call'd *Vitreous*, is concave in its anterior part; and in this cavity, commonly call'd the *Collet* of the vitreous humour, the poſterior convexity of the Cryſtalline is received. The membrane in which this humour is contained forms ſeveral cellules and a particular ſack to lodge the *Cryſtalline*.

I now proceed to the uſes of theſe parts. The Eye is defended from external injuries, not only by the

the bony cavity in which it is included, but alſo by the two Eye-lids, whoſe edges are always ſtretch'd by the *tarſal* cartilages which renders their union the cloſer. Mr. *Winſlow* has obſerv'd, that theſe cartilages only unite by their external edges, leaving in the reſt of their thickneſs a triangular ſpace, along which the lachrymal lymph has the liberty of paſſing during ſleep, to reach the lachrymal points. The lachrymal lymph, which continually moiſtens the forepart of the Eye, defends the *Cornea Tranſparens* from the impreſſions of the air, and this lymph afterwards paſſes into the noſe by means of the lachrymal points and the ducts which correſpond to them, unleſs theſe paſſages are cloſed up or obſtructed; for in ſuch a caſe, this lymph runs down the cheeks and occaſions a drivelling.

The uſe of the hairs on the Eye-lids, is, when we are awake, to ſtop the ſmall bodies which fluctuate in the air, and which might tarniſh the *Cornea Tranſparens*; and the uſe of the hairs on the Eye-brows is to moderate the impreſſion of too great a light.

As for the muſcles of the Eye they ſerve in general to turn it differently to the objects we look at, which they perform the more eaſily becauſe the round figure of the globe of the Eye, the ſoftneſs of the fat which ſurrounds it, and the flexibility of the nerves and all the veſſels which retain it, greatly diſpoſe it to yield to the ſmalleſt action of its muſcles. As for their particular uſe that of the *Muſculi Recti* is partly indicated by the different names they have received, and that of the *Obliqui* is principally to counterbalance the action of the *Recti* and to ſerve as a ſupport to the globe while theſe laſt act.

As for the membranes of the Eye their uſe is to contain the humours, and that of the humours is to change the direction of the rays of light in ſuch a manner as to re-unite them on the *Retina*, there to make

make impreſſions capable of exciting the ſenſation called *Sight*.

Phyſicians look upon the light as a particular agitation of a very ſubtle and fine matter, different from the air which is diffuſed in the ſpaces between objects and us. This matter receives its agitation from luminous bodies, ſuch as the ſun, lighted candles, *&c.* whoſe parts are ſuppoſed in a very great motion.

We know that the parts which compoſe the light run in a right line from objects to our eyes, and the ſucceſſion of parts thus propelled is called a *Ray*.

We are to conceive, *1ſt*, that from every point of an object, whether enlighten'd or luminous, an infinite number of Rays proceed, which extend themſelves on all ſides. Thoſe which fall upon the portion of the *Cornea* which correſponds to the Pupil, by their arrangement form a Cone, whoſe point is upon the object and its baſe on the Cornea. *2d*, That of thoſe rays which come from the ſame point of the object, ſuch as fall obliquely on the Cornea are refracted, inclining towards the Ray of the middle, in proportion as they paſs thro' the different humours of the Eye, ſo that they are all reunited on the ſame point of the Retina. Theſe different refractions of the collateral Rays to the central one, depend on the different conſiſtence and ſurface of the humours of the Eye.

This reunion of the rays of light (proceeding from the ſame point of an object) which is made on the *Retina* is abſolutely neceſſary, for without this the Sight would be imperfect, as it happens in thoſe who have the Cryſtalline too convex, in which the rays unite before they arrive at the Retina, on account of the great convexity, which is the reaſon why theſe people are obliged, in order to diſtinguiſh objects, to have recourſe to concave ſpectacles, whoſe

whoſe property is to ſcatter the rays of light in ſuch a manner, that notwithſtanding the exceſs of the convexity of the Cryſtalline, the rays only unite on the Retina.

We obſerve a contrary diſpoſition of the Cryſtalline in ſome ſubjects. This is pretty frequent in old people, in whom this tranſparent body having loſt ſome of its convexity, the rays paſs thro' the Retina without uniting in it, which is the reaſon why ſuch perſons ſee objects but imperfectly, unleſs they uſe ſomewhat convex glaſſes to ſupply this defect of the Cryſtalline.

We may eaſily perceive that if the Cryſtalline loſes its tranſparency, as it generally happens in the Cataract, the rays of light not being able to paſs thro' it, will not make on the Retina ſuch impreſſions as will produce ſight. We alſo perceive, that notwithſtanding the ſufficient impreſſions of theſe rays on the Retina, they will become uſeleſs for ſight, if the nervous filaments which compoſe this membrane are not in a condition for tranſmitting theſe impreſſions to the ſeat of the ſoul, as it happens in thoſe afflicted with the *Gutta Serena*.

ARTICLE X.

Of the Ear.

ANATOMISTS generally divide the Ear into external and internal. The external Ear comprehends not only the wing of the ear, but alſo the duct continuous with it, and which is cloſed by the *Tympanum*, which forms the ſeparation between the external and internal Ear. This laſt comprehends the caſe of the drum, and the labyrinth.

The wing of the Ear is principally compoſed of a cartilage, if we except the inferior part of it called the Lobe, which ſeems to be compoſed of a ſub-

ſtance partly pinguious and partly glandulous. The cartilage which compoſes the wing of the ear forms foldings, eminences, and cavities; the firſt or outermoſt of theſe foldings is called *Helix*, and that below it is called *Anthelix:* this laſt is as it were divided into two in its anterior part, and the cavity obſervable between theſe two portions is called *Scapha* or *Foſſa Navicularis.* There are alſo two eminences formed by this cartilage; the anterior one is called *Tragus* or *Hircus*, and the poſterior *Anti-tragus*, and between theſe two cavities we find a cavity called *Concha.* All this external part of the ear is covered with the ſkin, and with a membrane which appears nervous.

The duct of the ear is partly *cartilaginous*, partly *membranous*, and partly *oſſeous.* Its cartilaginous portion is a continuation of the cartilage which forms the wing of the Ear. This cartilaginous portion is in ſome parts interrupted as it were by ſections. The membranous portion is formed of the continuation of the ſkin which covers the duct, and this ſkin cloſes the Vacuities left by the cartilaginous portion. This ſkin is perforated with a great number of ſmall holes, which correſpond to as many glands concealed behind, and lodged in a particular piece of net-work. Theſe glands, called cerumenous, furniſh the wax of the Ear. Laſtly, the oſſeous portion, which is not found in a *Fœtus*, completes the duct, which is cloſed at the extremity by a very ſlender and tranſparent membrane, called the Drum or *Tympanum*, which is ſituated obliquely, the ſuperior part of its circumference being turned outwards, and the inferior part inwards. This membrane is compoſed of ſeveral Laminæ, which may be ſeparated by Maceration, and it is as it were enchaſed in a groove, formed internally at the extremity of this duct. The direction of this duct is oblique, and advances from behind forward.

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In a Fœtus we obſerve, that only the portion of this duct which has the groove for the Membrana Tympani is oſſeous, and this portion is called the bony circle, tho' it does not form a complete circle, being ſloped in its ſuperior part. While the Fœtus is included in the Uterus the *Tympanum* is covered externally with a white and mucilaginous ſubſtance, which dries afterwards, and is divided into ſeveral ſmall parts, which come out with the Wax of the Ear; and the duct, which is as it were membranous, is very much contracted, according to the obſervation of Mr. *Valſalva**.

The nerves diſtributed to the external Ear are furniſhed to it from the hard portion of the ſeventh pair, and from the ſecond cervical pair. The arteries come to it from the external Carotid, and its veins diſcharge themſelves into the Jugulars.

The external Ear has muſcles and ligaments. We only count three muſcles, which we have mention'd in the Myology. The ligaments are two in number, of which the anterior comes from the Zygomatic Apophyſis, and the poſterior from the Maſtoide Apophyſis.

The caſe of the Drum is a cavity whoſe ſurface, which is unequal, is lined by a membrane which ſome take to be a continuation of that which covers the internal part of the noſe, called *Membrana Pituitaria*. In this caſe we are to conſider two ducts, two apertures called *Feneſtræ*, four ſmall bones, three muſcles, and a branch of the fifth pair of nerves.

The ducts are diſtinguiſhed into anterior and poſterior; this laſt communicates with the Cellules of the Maſtoide Apophyſis, and the anterior eſtabliſhes a communication betwixt the caſe and the

* See *Valſalva*'s Treatiſe of the Ear.

bottom

bottom of the mouth. This duct is called *Tuba Euſtachiana*, a name which has been given to it becauſe it is very narrow near the caſe, and becauſe its cavity augments in proportion as it is removed from it, ſo that at its extremity, which correſponds with the bottom of the mouth, it forms an arch. In *Paris* there was a man who cured himſelf of deafneſs by forcing a liquor into this duct by means of a ſyringe, whoſe crooked pipe was introduced by the mouth to reach the orifice of this duct, which is behind the Uvula, about the middle of the internal wing of the Pterygoide Apophyſis †. The beginning of this duct is oſſeous, and the reſt of its extent is partly membranous and partly cartilaginous. We alſo obſerve in the caſe of the Drum, immediately above the Euſtachian Tube, a ſemi-canal, which lodges one of the muſcles of the Hammer.

The *Feneſtræ* are diſtinguiſhed from their figure into the oval and the round, and by means of theſe two apertures the Caſe communicates with the Labyrinth.

The ſmall bones are four in number, and are called the Hammer, the Anvil, the Stirrup, and the Orbicular. In the Hammer we are to conſider the head and the handle; the head has two eminences, and a cavity for its Ginglimoide Apophyſis with the body of the Anvil; the handle of the Hammer adheres to the *Membrana Tympani*. Mr. *Rau* has found an Apophyſis in the Hammer, which he calls the ſmall Apophyſis.

In the Anvil we are to conſider a body and two branches; in the body there are two cavities, and one eminence for its articulation with the Hammer. The branches of the Hammer are of an unequal length, and the ſhorteſt has no connexion with the other ſmall bones, but the longeſt, which is a little

† See *Garengeot*'s treatiſe of the inſtruments of ſurgery.

incurvated,

incurvated, terminates in a ſuperficial cavity to receive one of the convexities of the Orbicular Bone, while the other convexity of this bone is received into a ſuperficial cavity formed in the head of the Stirrup.

The Stirrup has an oval baſe, and two branches, which come out of it and unite to form its head. The branches are ſomewhat hollow in their internal ſurface, and it is in theſe cavities that the ſlender membrane is fixed which cloſes up the ſpace which the branches leave between them. The baſe of the Stirrup forms the *Feneſtra Ovalis*, and the Rotunda is only cloſed by a very ſlender and tranſparent membrane.

Of the three muſcles found in the caſe of the Drum, there are two which belong to the Hammer, and the third to the Stirrup. The muſcles of the Hammer are diſtinguiſhed into internal and external: the internal has its fixed point at the cartilaginous portion of the *Tuba Euſtachiana*, and the demicanal obſervable in the anterior part of the caſe. Its tendon forms a flexure, paſſing behind an oſſeous beak, and terminates at the beginning of the handle of the Hammer. The external muſcle of the Hammer, called alſo its anterior muſcle, is fleſhy, long, and ſlender; it adheres along the external ſide of the Euſtachian Tube by its anterior extremity, immediately before the ſpine of the Sphenoide. Its poſterior extremity terminates by a ſlender and long tendon, which ſlips into the Glenoide, or articular ſciſſure of the *Os Temporum*, and by a ſmall oblique groove of this ſciſſure, in the caſe where it adheres all along the ſlender Apophyſis of the Hammer. *Caſſerius* admits a ſecond external muſcle, which has its fixed point at the oſſeous part of the external duct of the Ear, and terminates at the Hammer, but the difficulty of diſcovering this muſcle has induced moſt Anatomiſts to doubt of its exiſtence.

As

As for the ſmall nerve obſervable in the caſe, commonly called the cord of the drum, it is a ramification of that branch of the fifth pair which is diſtributed to the Tongue. This nerve follows the courſe of the external muſcle of the *Hammer*, paſſes along the internal ſurface of the *Membrana Tympani*, and loſes itſelf in the hard portion, penetrating the bony duct which includes it.

The muſcle of the *Stirrup* is concealed in a Pyramidal Apophyſis ſituated at the poſterior part of the caſe, and its tendon paſſes thro' the hole obſerv'd at the point of this Apophyſis to terminate at the Stirrup, immediately below its head.

The ſecond, and at the ſame time the moſt depreſſed part of the internal Ear, is the Labyrinth, which is compoſed of three parts, called the *Snail*, the *Veſtibulum*, and the ſemi-circular canals. The Snail is ſituated anteriorly and externally, the ſemi-circular canals are behind, and the Veſtibulum in the middle.

The Snail is principally formed of a bony duct, which makes two tours and a half in a ſpiral manner. The cavity of this duct is gradually diminiſhed, and divided in all its extent into two halfs called *Flights*, diſtinguiſhed into external and internal by a partition called the *Spiral Lamina*, of which one part is oſſeous and another membranous.

In the Snail we may diſtinguiſh its baſe, its point, its kernel, and its two flights. The beginning of theſe two flights is at the *Veſtibulum*, in which the external flight, improperly called the ſuperior by ſome, opens while the internal terminates at the *Feneſtra Rotunda.* Theſe two flights communicate with each other at the point of the Snail, according to the obſervations of Mr. *Mery**.

* See his treatiſe of the ear, inſerted in the mechanical and phyſical explication of the functions of the ſenſitive ſoul, by Mr. *Lamy.*

The

The Veſtibulum is a ſmall cavity, irregularly round. It is lined internally with a membrane, interſperſed with a great many veſſels. In it we conſider ſeven apertures, beſides ſeveral ſmall holes, which afford a paſſage to the blood veſſels and nerves which penetrate into this cavity; of theſe apertures there are five, which correſpond to three ſemi-circular canals, the ſixth correſponds to the *Feneſtra Ovalis*, and the ſeventh is the orifice of the external flight of the Snail.

The ſemi-circular canals have been diſtinguiſhed into ſuperior, middle, and inferior: the ſuperior is by one of its extremities joined to the inferior, ſo that the cavities of theſe two ducts are confounded, forming but one aperture in the Veſtibulum. In theſe ducts, as well as in the Flights of the Snail, the ſoft portion of the ſeventh pair is diſtributed. We alſo diſcover in it ſeveral blood veſſels, both by the aſſiſtance of fine injections and by inflammations, as Mr. *Winſlow* ſays he has obſerved.

Hearing is a ſenſation excited by ſounds received into the Ear, and ſounds, as I have before obſerv'd, only conſiſt in a ſudden tremulation or undulation of the parts of the air, excited by an elaſtic body put in action. The particular figure of the external Ear in form of a Funnel, favours the entrance of a large quantity of the parts of the air put in motion by ſonorous bodies, and its cartilaginous compoſition is the reaſon why its parts are maintained in their full force. Laſtly, the obliquity of the duct into which theſe parts are received alſo augments their force, by giving room to reflect themſelves differently. The uſe of the Wax amaſſed in the duct of the Ear, is to prevent the entrance of filth and inſects, which might induce a change in the *Membrana Tympani*. 'Tis to be obſerved, that too great a quantity of this Wax amaſſed in the duct, becomes the cauſe of deafneſs. Sounds

Sounds having arrived at the *Membrana Tympani*, it is by them agitated; and the action of the muſcles of the Hammer, which, as I have ſaid, adhere to it, being rendered more or leſs tenſe, it by this means accommodates itſelf to the weakneſs or violence of ſounds. Some have aſſerted, that this membrane is not abſolutely neceſſary to hearing. It muſt indeed be granted, that the ſenſation of hearing may be excited without the aſſiſtance of the *Membrana Tympani*, as the experiment on deaf perſons, who hear much better by ſpeaking into their mouth than into their ear, ſeems to prove. But we cannot deny that this membrane is abſolutely neceſſary to defend the parts included in the caſe from the impreſſions of external objects, ſince we find that animals in which this membrane is perforated ſoon after loſe their hearing.

Two principal uſes are aſcribed to the Tuba Euſtachiana, 1*ſt*, to ſerve as a diſcharge to the Lymph furniſhed by the glands of the membrane which lines the Cellules of the Maſtoide Apophyſis, which Lymph maintains the flexibility of the ſoft parts of the caſe. 2*d*, To ſerve as a retreat to the air contained in the caſe, while the *Membrana Tympani* is drawn inwards by the action of the internal muſcle of the Hammer. The loſs of hearing, which always happens when the Euſtachian tube is cloſed up, ſeems to prove theſe uſes.

The ſmall bones contained in the caſe being agitated by the ſounds which have arrived at the Tympanum, communicate their agitations to the internal air which poſſeſſes the ſpaces which the ramifications of the ſoft portion of the Auditory Nerve have left in running thro' the different cavities of the labyrinth, and communicating its agitations to theſe nervous ramifications, it excites the ſenſe of hearing. Some add, that the internal air alſo receives its agitations by the air contain'd in the caſe, which is agitated

agitated at the ſame time with the ſmall bones; and that theſe agitations are communicated to this internal air by means of the Feneſtra Rotunda, which, as I have ſaid, is only cloſed up by a very ſlender membrane.

As the nervous expanſions or ramifications furniſhed by the ſoft part of the ſeventh pair correſpond to the different cavities of the labyrinth thro' which they are diſtributed, we may readily comprehend that theſe cavities being different from each other, whether in length or breadth, the nervous expanſions or ramifications diſtributed in them muſt alſo differ. This difference of length and breadth makes it reaſonable to ſuppoſe, that theſe nervous expanſions may have more relation and proportion with certain ſounds than with others: and ſuppoſing this conjecture true, that is, that ſome of theſe expanſions have more or leſs breadth and length than others, according as they are deſtin'd to make us have the ſenſation of different ſounds, we will eaſily conceive why the labyrinth and its parts are not larger in an infant than in an adult; for if the dimenſions had been different at theſe two ages, the ſame ſounds would have acted upon us in one manner in our infancy, and in another when we are farther advanced in years. 'Tis for the ſame reaſon that the ſmall bones in the caſe are as large in an infant as in an adult. Thus, for inſtance, the baſe of the Stirrup ought always to correſpond to the bulk of the Feneſtra Ovalis, and communicate the ſame ſounds, and in the ſame manner, to the labyrinth. But if the author of nature has taken ſo much care that at different ages we ſhould hear the ſame ſounds in the ſame manner, he has taken no leſs care that the ſame ſound ſhould not be heard differently at the ſame time. This nature has provided for, by giving the ſame bulk and figure to the right and left labyrinth, as well as to the bones of the one and the other ſide;

and even according to the remark of *Valſalva**, if there is any natural defect in one of theſe parts on one ſide, the ſame defect is found in the ſame part on the oppoſite ſide.

'Tis to be obſerved, that on account of the communication of the third branch of the fifth pair of nerves with the hard portion of the ſeventh, and at the ſame time of the diſtribution of this third branch of the fifth pair to the tongue, ſome have pretended to explain why perſons born deaf are alſo neceſſarily dumb. But if 'tis true, that among theſe perſons born deaf there are ſome who are only dumb at the ſame time by the alteration of theſe nerves, we may alſo readily conceive that there are many who are dumb, becauſe not hearing any ſounds, they are conſequently uncapable of learning any language by their means. In a word, 'tis to be obſerved that there is a particular manner of teaching them to ſpeak, an account of which we have in a book entitled *Surdus Loquens ſive Diſſertatio de Loquela*, &c. wrote by Mr. *Amman*, a *Swiſs* Phyſician, who ſettled in *Holland*, and taught ſeveral perſons who were born deaf and dumb to ſpeak. Mr. *Winſlow* has aſſured me, that he has often converſed with a lady of *Harlem* born dumb and deaf, to whom Mr. *Amman* had not only taught her native language, but alſo the *French* and Latin. But 'tis to be obſerved, that all theſe perſons can only carry on a converſation by carefully obſerving the different motions of the lips of thoſe who ſpeak to them, for 'tis by theſe motions alone that they comprehend what is ſaid to them.

* See his treatiſe of the Ear.

SEC-

SECTION III.

Of ANGIOLOGY.

CHAP. I.

Of the Arteries in general.

ANGIOLOGY is that part of Anatomy which treats of the ſanguiferous veſſels, whether Arteries or Veins. The *Arteries* are thoſe veſſels which receive the blood from the heart, to diſtribute it to all the parts of the body; and the *Veins* are thoſe veſſels which carry back, from all the parts to the heart, a portion of the blood which had been diſtributed to theſe parts thro' the Arteries.

Theſe two kinds of veſſels are eaſily diſtinguiſhed in a living body, the former, or the Arteries, having two motions, which the Veins have not, or which at leaſt are not ſo perceptible in them. In one of theſe motions the Arteries are dilated, and in the other contracted. The former is called *Diaſtole*, and the latter *Syſtole*.

The cavity of the arteries is gradually diminiſhed in proportion as they recede from the heart, whereas the cavity of the veins augments in proportion as they approach nearer to this organ. This particular diſpoſition of the capacity of theſe veſſels, which gives them nearly a conical figure, is of great advantage to augment the circulation of the blood in the arteries; for we know that the motion of a liquor augments in paſſing from a large into a narrower ſpace. What I have ſaid of the figure of the arteries, only regards the capacity of their principal

trunks. In a word, we obſerve that ſeveral branches which ariſe from the diviſion of theſe different trunks have a cylindrical figure, which renders the cavity of theſe veſſels equal in a portion of their extent. Theſe branches alſo furniſh a great many others, which diminiſh to ſuch a degree, that the eye cannot diſcover them without the aſſiſtance of a microſcope. In order to diſtinguiſh them the better, 'tis alſo neceſſary to have recourſe to fine and colour'd injections. Mr. *Vieuſſen* * has called theſe veſſels *Neuro-Lymphatic*, on account of their exceſſive ſmallneſs, which made them appear to him like ſo many nervous filaments. They are at preſent called Arterial and Venous Lymphatics, becauſe in conſequence of their ſmallneſs they only admit into their cavities the lymphatic parts of the blood, whoſe Molecules are infinitely ſmaller than thoſe of its red part; and it is only in a preternatural ſtate that the Molecules of the red part inſinuate themſelves into them, as it happens in inflammations. Theſe veſſels are very numerous in the parts which are naturally white, ſuch as the ſkin, the *Conjunctive*, commonly called the white of the Eye, and generally all the membranes, *&c.* Theſe lymphatic veſſels ought to be diſtinguiſhed from thoſe which accompany the conglobate glands, or which are ſeen in large quantities on the ſurface of certain Viſcera, as on that of the human liver, and ſtill better on that of a hog, on the ſpleen of a calf, *&c.* Theſe laſt are called Valvular Lymphatics, on account of the great number of Valves found in them. I ſhall mention theſe veſſels in the *Adenology*, in treating of the conglobate glands.

Tho' 'tis very difficult to determine the number of the membranes or coats of the blood-veſſels, yet ſome authors deſcribe them in ſuch a manner as if

* See his treatiſe of liquors.

they

they were as eaſy to be diſtinguiſhed as thoſe of the inteſtines. Mr. *Heiſter* counts five of them: the firſt he calls vaſcular, the ſecond cellular, the third tendinous, the fourth muſcular, whoſe fibres are muſcular. This is the moſt conſiderable, which has made Mr. *Douglas* * think that 'tis the only one which ought to be admitted, and the fifth is nervous. Theſe different coats are only to be obſerved on the large trunks, and for this purpoſe we even prefer the Aorta of an ox, where they are more perceptible than on the human Aorta. Mr. *Morgagni*, a celebrated Anatomiſt, ſpeaking of theſe membranes ſays, that the deſcription given of them by the moderns is ſufficiently perceptible on the Aorta of an ox, but not in man†.

Of the Arteries in particular.

ALL the Arteries begin by two principal trunks, one of which riſes from the right Ventricle of the heart to be diſtributed to the lungs, and this is called the *Pulmonary Artery:* the ſecond, which is called the *Aorta*, riſes from the left Ventricle to be diſtributed in general to all the parts, even the lungs and heart not excepted.

The Aorta at its beginning furniſhes two Arteries, called *coronary*, one of which is anterior and the other poſterior. They are diſtributed to the ſubſtance of the heart, and to that of its Auricles. The orifices of theſe two veſſels are diſcover'd in the Aorta, oppoſite to the ſuperior part of the *Sigmoide* Valves. The Aorta runs afterwards a little obliquely to the right, whence returning to the left and backwards, it deſcribes a ſemi-circle called the *Croſs* of the Aorta, from the ſuperior part of which three conſiderable branches generally riſe: to theſe three

* See *Jac. Douglaſſi* Deſcriptio Peritonei.
† See *Morgagni* adv. anat. 11. animad. 38.

branches in common we give the name of *Aorta Aſcendens* or *Superior*, and the continued trunk of the *Aorta* immediately below its croſs is called *Aorta Inferior* or *Deſcendens*.

The three branches which compoſe the *Aorta Superior* have each particular names. The branch to the right is called the *right Subclavian*, that to the left the *left Subclavian*, and that in the middle is called the left *Carotid*.

The *Subſclavian Arteries* recede almoſt tranſverſly each from its reſpective ſide, behind and under the Clavicles, for which reaſon they are called *Subclavian*. They terminate in the ſuperior edge of the firſt rib, between the inferior adheſions of the Muſculi Scaleni, where they take the name of Axillaries, as I ſhall afterwards obſerve. Each *Subclavian* Artery in this courſe furniſhes four principal branches, called the *internal Mammary*, the *Vertebral*, the *Cervical*, and the *ſuperior Intercoſtal*, to which we ought to add the *ſuperior Diaphragmatic*.

The right *Subclavian* alſo gives riſe to the Carotid of the ſame ſide.

The internal Mammary deſcends internally along the ribs near the Sternum, and loſes itſelf in the *Muſculus Rectus*, in its courſe furniſhing ramifications to the gland called *Thymus*, to the Pericardium, and the Mediaſtinum. It alſo furniſhes others, which paſs thro' the intercoſtal muſcles to be diſtributed to the breaſts.

The *vertebral* or internal *Cervical* enters into the holes which are form'd in the tranſverſe Apophyſes of the Vertebræ of the Neck, furniſhing in this courſe ramifications to the Medulla Spinalis and adjacent Muſcles. This Artery arriving at the upper part of the Neck, near the Occipital, forms three different windings before it enters into the Cranium. The firſt, which is very ſmall, is in its paſſage thro' the oblique hole of the tranſverſe Apophyſis of the

ſecond

ſecond Vertebra of the Neck. The ſecond is, at its coming out of this hole, near the tranſverſe Apophyſis of the firſt Vertebra; and the third, which is the moſt conſiderable, is behind the ſuperior oblique Apophyſis of this ſame *Vertebra*. This Artery afterwards pierces the Dura Mater, and enters the Cranium thro' the great occipital hole. From its entry it runs obliquely on the anterior part of this bone to unite with its correſponding Artery, and by their union the common trunk call'd the *vertebral* and by ſome the *baſiliary* Artery is form'd; which, after having furniſh'd ſeveral branches to the *Medulla Oblongata*, advances to the *Os Sphenoides* where it is divided into two branches, each of which communicates with the poſterior branch of the adjacent internal Carotid and loſes itſelf in the ſuperior lobe of the Brain. Each vertebral Artery, from its entrance into the Cranium, is diſtributed to the Cerebellum, and alſo furniſhes a branch for the formation of the ſpinal Artery, which deſcends along the ſpinal Marrow to which it is diſtributed.

The cervical Artery is at firſt divided into two branches, one of which runs anteriorly to be diſtributed to the anterior part of the Neck, and particularly to the Trachea Arteria, the Œſophagus, and the Pharynx. The other branch is poſterior, and is diſtributed to the Muſcles of the Neck and to the adjacent parts.

The *ſuperior Diaphragmatic* deſcends along the Pericardium, to which it furniſhes branches, and afterwards loſes itſelf in the ſuperior part of the Diaphragm.

The *ſuperior Intercoſtal* riſes from the inferior part of the Subclavian, deſcends along the internal ſurface of the two, three or four ſuperior ribs near the Vertebræ; and ſends under each of theſe ribs a branch which internally ſlides along their inferior edges, diſtributing itſelf to the intercoſtal Muſcles and the Pleura.

Pleura. Some branches enter the duct of the Vertebræ. This Artery ſometimes riſes from the *Aorta inferior.*

The Subclavian comes from the Breaſt, paſſing thro' the diſtance which the anterior branch of the ſcalenus Muſcle leaves in receding from its poſterior branches, and after its coming out it is call'd the *Axillary.* It furniſhes four principal branches, call'd the external Mammary, the internal *Scapulary*, the external *Scapulary* and the *Humeral.*

The external *Mammary* or the *Thoracic* is diſtributed to the anterior part of the Breaſt, as well to the Muſcles as to the Breaſts. The internal *Scapulary* furniſhes branches to the internal ſurface of the *Omoplata*, and the external *Scapulary* to the Muſcles of its external ſurface. The *Humeral* is principally diſtributed to the *Deltoide* Muſcle.

The *Axillary* Artery afterwards deſcends along the internal part of the arm, where it aſſumes the name of Brachial, being in this place, as well as in the armpits, only covered with the ſkin and the fat. In its courſe it furniſhes ramifications to the adjacent muſcles, and in the upper part of the arm, a pretty conſiderable branch which runs obliquely towards its ſuperior part along which it deſcends, advancing to the external Condyle. In proportion as the Brachial Artery deſcends along the arm, it advances towards its anterior part, concealing itſelf under the Biceps Muſcle, and arriving at the inferior part of the arm, it paſſes under the Aponeuroſis of this muſcle, and is divided into two principal branches, called the *Cubital* and the *Radial.* We ſometimes find perſons in whom this diviſion is made in the middle part of the arm, and others at its ſuperior part, but the moſt common diviſion is about an inch below the internal Condyle of the *Humerus.*

The cubital Branch paſſes behind the *Muſculus Rotundus*, and in this part it furniſhes three pretty conſiderable branches, one of which paſſes under the adjacent Muſcles to which it is diſtributed, and aſcends behind the internal Condyle to communicate with another branch which the brachial trunk has furniſhed. The ſecond branch of the Cubital goes thro' the interoſſeous ligament in its ſuperior part, to be diſtributed to the Muſcles of the external part of the fore arm. The third deſcends along this ligament, and when it arrives at the *Muſculus Quadratus* it alſo paſſes thro' the ſame ligament and loſes itſelf in the adjacent parts.

The cubital Branch continues its courſe along the fore arm, and oppoſite to the cubitus it is covered by the *Sublimis* and *Cubitalis Internus*. Arriving at the wriſt it paſſes over the annular, internal and common ligament, and at the ſides of the *Os Piſiforme* and *Curvatum*, where it furniſhes a branch which ſlips behind the tendons of the *Sublimis* and *Profundus* to form an arch at the top of the internal and ſuperior part of the *Metacarpus*, which is diſtributed to the interoſſeous muſcles, *&c.* This branch of the cubital is afterwards inoſculated with the radial branch, which has paſſed thro' the abductor muſcle of the fore finger to enter into the hand. The cubital is afterwards continued in the hand where it generally forms a kind of croſs, from which ſeveral branches riſe which are continued internally along the lateral parts of the fingers, and principally of the four laſt, advancing even to their extremities where theſe branches communicate. Theſe Arteries are only cover'd in the hand by the *Aponeuroſis Palmaris*.

There are ſome perſons on whom the cubital branch, inſtead of ſlipping behind the *Muſculus Rotundus* as it generally does, paſſes before this muſcle, and is then ſo ſuperficial that it may eaſily be miſtaken

taken for a vein of the fore arm, if we are not careful to examin its pulſations before the application of the ligature in blood letting; for 'tis certain, that this ligature, when pretty tight, renders the pulſation of the Arteries leſs ſenſible. We ought therefore to be abſolutely ſure of the ſituation of the Arteries before we apply the ligature for blooding in the arm, if we would avoid running a riſque of opening an Artery inſtead of a Vein.

The *radial* branch after having ſent a ramification or two, which mount to the external Condyle, to communicate with the branch which has paſſed obliquely behind the arm, advances before the tendon of the *Muſculus Rotundus*, deſcends along the internal part of the *Radius*, being only covered towards the inferior extremity of this bone with the common teguments: It afterwards paſſes under the extenſor tendons of the thumb, croſſes the adductor muſcle of the fore finger, furniſhes branches to the thumb, and continuing its road to the internal part of the Metacarpus is inoſculated with the branch of the Cubital, which has paſſed behind the tendons of the *Sublimis* and *Profundus*.

The ramifications which ariſe from the trunk of the brachial Artery above its diviſion, and which communicate with thoſe which come from the cubital and radial branches, are of great aſſiſtance after the operation for the aneuriſm at the folding of the elbow; for as I have ſhewn, that the brachial Artery was only generally divided below this folding, we eaſily conceive, that the ligature caſually applied in ſuch caſes being made on the trunk of the Artery itſelf, the parts which compoſe the fore arm being ſituated below, will be deprived of nouriſhment without the aſſiſtance of theſe veſſels of communication, which are alſo call'd collateral veſſels; ſince it is by them that the nutritive juices are diſtributed to all the parts of the fore arm. But this is

not the caſe if the brachial Artery is divided above the flexure of the elbow; for on this occaſion, the ligature being only made on one of its branches, the blood is freely diſtributed to all the fore arm and the hand, by means of the branch which is not tied, and will even be diſtributed to the parts of the fore arm and hand which receive their Artery from the tied branch, in conſequence of the communication between the cubital and radial branches, as I have before obſerved. We may be in a manner confident of the ſucceſs of the operation, if after the ligature is made, the pulſe is felt as uſual, which is a proof that the ligature is not made on the trunk of the Artery, but on one of its branches.

The right Carotid takes its riſe from the Subclavian, whereas the left riſes immediately from the croſs of the Aorta. It aſcends along the anterior part of the Aorta, at the ſide of the *Trachea Arteria*, being only covered in this road by the maſtoidean and Sterno hyoidean Muſcles, without furniſhing conſiderable branches; but when it has reached as high as the Larynx it is divided into two principal branches, of which one, which appears to be as it were a continuation of the trunk of the Carotid, is call'd the internal Carotid. This penetrates into the Cranium, and in its courſe forms three flexures, the firſt of which is lodg'd in the oſſeous duct of the *Temporal*, and the other two in the *Sphenoidal Receptacle* or cavernous Sinus; and a little before its riſing from the Sinus it is diſtributed to the Eye by ramifications, which enter into the Orbit of the Feneſtra Sphenoidalis and thro' the Foramen Opticum; it alſo furniſhes ramifications to the pituitary gland. The internal Carotid afterwards pierces the Dura Mater, and runs under the baſe of the Cranium to the ſide of the Infundibulum at a ſmall diſtance from the other Carotid; and there it is divided into two principal branches, one anterior and the

the other poſterior. The anterior branch, after going ſome way, is by an anaſtomoſis or communication united with the parallel branch of the Carotid of the oppoſite ſide, and is afterwards divided into a great many branches which are diſtributed to the anterior parts of the Brain. The poſterior branch communicates firſt with the baſiliary or vertebral trunk, and is afterwards divided into ſeveral ramifications, which are diſtributed to the middle and poſterior parts of the Brain.

The other branch of the Carotid, call'd the *external Carotid*, affords ſeveral branches. The firſt, call'd *Thyroidean*, is diſtributed to the Larynx. The ſecond, call'd *Sublingual*, is diſtributed to the ſublingual gland and to the tongue, where it is call'd *Arteria Ranina*. The third, call'd the *external Maxillary*, furniſhes branches to the gland of that name, and to the adjacent muſcles, and advances over the inferior jaw, to reach the joining of the lips to which it is diſtributed. It alſo paſſes to the ſide of the noſe to which it alſo furniſhes branches, and reaches the great canthus of the eye, where it is call'd *Arteria Angularis*, which after having furniſhed branches to the eye-lids and eye, and communicated with one of the ramifications of the internal Carotids which have paſſed into the Orbit, it loſes itſelf in the frontal Muſcles, where it communicates with the temporal Artery.

The fourth branch is call'd the *occipital Artery*, becauſe it loſes itſelf in the occiptal Muſcles. This Artery is diſtributed to the *Dura Mater* by a branch which enters the Cranium thro' the *Foramen Maſtoideum*.

The fifth branch, call'd *Arteria Auricularis*, furniſhes ramifications to the external Ear, and afterwards enters into the caſe of the Tympanum, to be diſtributed to the membrane which lines it and to the parts included in it.

The

The trunk of the external Carotid continues its road behind the angle of the inferior jaw, and coming oppoſite to its condyloide Apophyſis it ſends out four principal branches which are ſub-divided into ſeveral others. The firſt, after having furniſhed the Crotaphite, penetrates the Orbit thro' the *Feneſtra Spheno-maxillaris*, to be diſtributed to the eye and its muſcles. It is alſo diſtributed to the internal part of the noſe by ramifications which paſs thro' the *Foramen Spheno-Palatinum*, and to the palate by others which paſs thro' the *Foramen Guſtatorium* or *Palatinum Poſterius*. The ſecond branch loſes itſelf in the parotid gland. The third, by ſome call'd the internal maxillary, enters the duct of the inferior jaw-bone to be diſtributed to the teeth, and comes out of it afterwards thro' the *Foramen Mentorium* to loſe itſelf in the adjacent parts. When the fourth branch, furniſhed by the external carotid, comes near the condyle of the jaw-bone, it is call'd the Artery of the Dura Mater, and by ſome *Arteria Spinoſa*. This branch enters into the Cranium thro' the *Foramen Rotundum Parvum*, or *Spinoſum*, and is diſtributed to all the Dura Mater, communicating not only with the Artery of the Dura Mater of the oppoſite ſide, but alſo with the other branches which the Carotid furniſhes to it, and which enter into the Cranium, either by the parietal holes, or the internal orbitaries, *&c.*

The external Carotid paſſes afterwards over the zygomatic Apophyſis and the crotaphite Muſcles, where it terminates in forming the temporal Artery, which is divided into three principal branches, diſtinguiſhed into *Anterior*, *Middle* and *Poſterior*, which are diſtributed to the *frontal* and *occipital* Muſcles, communicating not only with the ramifications of the *temporal Artery* on the oppoſite ſide, but alſo with the *naſal* and *occipital* Arteries.

The

The inferior Aorta appears to be as it were a continuation of the trunk of the Aorta in oppoſition to the Aorta ſuperior, which is form'd by the branches ariſing from its croſs. The beginning of the Aorta inferior correſponds to the body of the fourth vertebra of the back. Lying on the left lateral part it afterwards deſcends along the body of the other vertebræ of the back, and of the four ſuperior of the loins. But in proportion as the Aorta deſcends it advances towards the middle part of the body of the vertebræ on which it lies, and having arrived on the fourth of the loins it is divided into two conſiderable branches call'd the Iliacs.

The Aorta inferior in all this courſe furniſhes leſs conſiderable branches, and ſeveral ramifications. It communicates with the pulmonary Artery by a very conſiderable duct, call'd *Arterial*, which is obſervable at its beginning, but is of no uſe except in the *Fœtus*, which is the reaſon that in adults, where its bulk is very ſmall, it only retains the form of a ligament.

The Aorta inferior furniſhes ſeveral ramifications in the Thorax; the firſt generally riſe from its anterior part, and are diſtributed to the lungs, running along the Bronchia, for which reaſon they are call'd the *Bronchial Arteries*, which are ſometimes furniſhed by the firſt of the inferior Intercoſtals.

The inferior intercoſtal Arteries are generally ſixteen in number, eight on each ſide. They riſe from the poſterior part of the Aorta, run from one ſide to another tranſverſely on the bodies of the Vertebræ, and after furniſhing ramifications which enter the canal of the Vertebræ, and others diſtributed to the vertebral Muſcles, they continue internally along the inferior edge of each ſide, diſtributing themſelves to the intercoſtal Muſcles and the Pleura. The undermoſt Intercoſtals on thoſe which go to the

the falſe ribs are alſo diſtributed to the muſcles of the lower belly.

It ſometimes happens that the two firſt inferior Intercoſtals, and eſpecially thoſe of the left ſide, furniſh the four ſuperior ribs of their ſide with the ramifications diſtributed to them. The Aorta inferior from its anterior part ſends branches to the Œſophagus, and theſe branches are call'd Œſophagean Arteries.

The Aorta inferior riſes from the Breaſt, paſſing thro' the ſpace which the tendons or appendices of the Diaphragm leave between them. At its entrance into the lower belly it furniſhes a branch to the left ſide of the Diaphragm, call'd the inferior diaphragmatic Artery; and alſo, by its anterior part, a branch pretty conſiderable for its bulk, but very ſhort. This is commonly call'd the *Cœliac Trunk*, which after having furniſh'd a ramification to the right ſide of the Diaphragm, is divided into three branches, call'd the *Stomachic Coronary*, the *Hepatic*, and the *Splenick*. The *Stomachic Coronary* is ſo call'd becauſe one of its principal ramifications embraces the ſuperior orifice of the Stomach almoſt like a crown. The other ramifications of this branch are diſtributed to the anterior and poſterior ſurfaces of the Stomach.

The different ramifications produced by the Stomachic Artery not only communicate with each other, but alſo with all the other ramifications furniſhed to the Stomach, as well by the *hepatic* as by the *ſplenic* Artery. It frequently happens, that the Stomachic Artery furniſhes a conſiderable branch which loſes itſelf in the liver, independently of the hepatic Artery which is proper to it.

The hepatic Branch furniſhes four principal Branches, call'd the *Pyloric Artery*, the right *Gaſtro-epiploic*, the *Duodenal* and the *Cyſtic*. The *Pyloric* is diſtributed to the right and ſuperior part of

the Stomach. The right *Gaſtro-epiploic*, which runs along the grand curvature of the Stomach, is diſtributed to its bottom and to the epiploon. The *Duodenal* is diſtributed to the *Duodenum* and the *Cyſtic* to the Gall-bladder. This laſt Artery is ſometimes double. The hepatic Branch, after furniſhing all theſe ramifications, reaches the concave part of the liver, and loſes itſelf in the ſubſtance of that organ.

The ſplenic Branch is diſtributed in the ſubſtance of the Spleen. In its courſe it furniſhes ſeveral ramifications which have different names. The *Vaſa Brevia* are thoſe which it furniſhes to the body of the Stomach, as well as the Veins which accompany them. The left Gaſtro-epiploic is the ramification which is diſtributed to the left lateral part of the bottom of the Stomach, and to the portion of the Epiploon which is adherent to it. The *Pancreatic* are thoſe diſtributed to the Pancreas, and the *Epiploic* are thoſe which go to the *Epiploon*.

The ſecond branch of the Aorta inferior, furniſh'd by its anterior part in the lower belly, is call'd the *ſuperior Meſenteric*. It runs to the center of the Meſentery, ſlipping between the two Laminæ of which it is compoſed, and is divided into ſeveral branches which firſt communicate by reciprocal Arches, and whoſe ramifications form new communications, which leave between them ſpaces of all figures; and the ramifications, after being diſtributed to the Meſentery and its Glands, loſe themſelves in the *Ileum*, the *Cæcum*, and the right and ſuperior part of the *Colon*, by a great number of ramifications which embrace the inteſtinal Canal.

The Aorta inferior furniſhes on each ſide a little below the ſuperior Meſenteric, thoſe Arteries which go to the Kidneys, commonly call'd the emulgent Arteries. That on the right ſide ſends a ramification to the *Capſula Atrabiliaris* of that ſide, while

the

the left *Atrabiliaris Capſula* receives one immediately from the Aorta.

About an inch below the Emulgents there generally riſe two ramifications call'd the ſpermatic Arteries, which in man run to the rings of the abdominal Muſcles, being in this diſtributed to the adjacent parts, they are afterward engaged in the *Tunicæ Vaginales*, and diſtributed to the Teſticles and Epididymes. Theſe veſſels in women come not out of the lower Belly, and are diſtributed to the Ovaries, the Tubes and the Uterus.

The inferior Aorta furniſhes a third branch by its anterior part, about an inch below the ſpermatic Arteries, and this branch is call'd the inferior Meſenteric. It is divided into three principal ramifications, one of which aſcends to reach the *Colon* and communicate with the ſuperior Meſenteric. The ſecond is diſtributed to the inferior part of this Inteſtine. The third deſcends behind the Rectum, diſtributing itſelf to it and loſes itſelf in its inferior part. This laſt ramification is call'd the *internal hæmorrhoidal Artery*.

The *Aorta* alſo furniſhes, beſides that from its poſterior part in all its courſe in the lower belly, different ramifications call'd lumbar Arteries, which are principally diſtributed to the Medulla Spinalis and adjacent Muſcles.

The Aorta having arrived at the fourth Vertebra of the Loins, is divided into two branches call'd the *Iliacs*; and in the ſame place furniſhes, by its poſterior part, two or three ramifications call'd *Arteriæ Sacræ*, which are diſtributed to the adjacent parts, but principally to the Nerves which are in the canal of the *Os Sacrum*.

Each iliac Branch, after having gone about three fingers breadth, is divided into two other branches of an almoſt equal bulk, one of which runs into the baſon of the *Hypogaſtrium*, and the ſecond advances

to the arch of the abdominal Muſcles. This laſt is call'd the *external Iliac*, to diſtinguiſh it from the former call'd the *internal* or *hypogaſtric Iliac*, which after having gone about an inch, is incurvated a little obliquely from behind forward, and runs to the lateral part of the bladder, where it aſſumes the name of the *umbilical Artery*, whoſe bulk is very different in an adult from what it is in a Fœtus; for in this laſt this Artery is very conſiderable, and forms, as I have ſaid, a part of the umbilical cord; whereas in an adult this Artery is ſhrivel'd up from its beginning, and even becomes ligamentous from about the middle part of the bladder to the navel where it terminates, only retaining its cavity in the part where it furniſhes ramifications to the bladder and adjacent parts.

The hypogaſtric Artery, at its curvature, generally furniſhes four or five principal branches which riſe from its convexity pretty near each other. Sometimes they ariſe ſeparately, and at other times ſome of them come thro' a ſmall common trunk. I ſhall begin with that branch which riſes from the baſon of the ſuperior part of the *Foramen Ovale*. This Artery furniſhes ramifications to the obturator Muſcles, and loſes itſelf in the *Triceps* and *Pectinæus*. This branch is call'd *Arteria Obturatrix*.

Of the other Branches, the moſt poſterior, after ſending ſome ramifications to the *Os Sacrum*, paſſes behind the Pſoas Muſcle, to which it is alſo diſtributed, and at laſt loſes itſelf in the Iliac Muſcle. There are alſo ſome ramifications which penetrate the *Oſſa Ilia*. This branch is call'd the *Iliaca Minor*.

The third Branch is call'd *Sartoria*, it riſes from the Pelvis by the ſuperior part of the groove call'd *Iſchiadic*, paſſes above the *Muſculus Pyriformis*, to which it furniſhes ramifications as well as to the adjacent parts, and at laſt loſes itſelf in the *Muſculus Sartorius* and in the *Minor*. The

The fourth Branch, call'd *Sciatic*, riſes from the Pelvis by the ſame groove, paſſing under the *Muſculus Pyriformis*, and thro' the nervous cords which compoſe the iſchiadic Nerve, to which it furniſhes a conſiderable ramification which accompanies that Nerve, it is alſo diſtributed to the *Muſculi Quadrigemini*, and at laſt loſes itſelf in the *Sartorius Major*. A ramification of this branch paſſes under the *Muſculus Quadratus*, and loſes itſelf at the articulation of the Femur.

The fifth Branch, by ſome Anatomiſts call'd *Inguinalis Communis*, is divided into two principal ramifications, which are diſtinguiſh'd into anterior and poſterior. The anterior runs towards the union of the bladder to the rectum in man, and after having furniſh'd ramifications to the Veſiculæ Seminales, the neck of the bladder, the ſuperior proſtatæ, and the adjacent portion of the rectum, it paſſes under the *Os Pubis* at the ſide of a conſiderable vein placed directly under the Symphiſis; and it runs along the ſuperior part of the Penis betwixt this vein and a nerve, diſtributing itſelf in its courſe to the Corpora Cavernoſa, and even communicates with the ramifications of a branch furniſhed by the crural Artery, which is diſtributed to the teguments of the Penis. This branch of the *Cruralis* is call'd *Inguinalis Cutanea*, to diſtinguiſh it from the former, which is call'd *Inguinalis Externa*. There are ſeveral ſubjects in whom the *Inguinalis Externa* proceeds from the poſterior branch of the *Inguinalis Communis*.

The anterior ramifications of the *Inguinalis Communis* ſometimes riſes immediately from the *Hypogaſtric*, eſpecially in women, where it is diſtributed by ſeveral ramifications to the lateral parts of the Uterus, which communicate not only with the ramifications of the ſpermatic Artery of the ſame ſide,

but alſo with the ſimilar ramifications furniſhed by the hypogaſtric Artery of the oppoſite ſide.

The poſterior ramifications of the *Inguinalis Communis* comes from the Pelvis, by the inferior part of the iſchiadic Groove, paſſes behind the Spine of the Iſchium, ſlips between the two ligaments adhering to the *Iſchium* and the *Os Sacrum*, and reaches the internal ſurface of the tuberoſity of the *Iſchium*, along which it is continued to the beginning of the Corpora Cavernoſa of the ſame ſide, or rather to the erector Muſcle which covers it, at which part this ramification furniſhes ſome others to the *Sphincter Ani*, which are call'd *Hæmorrhoidales Externæ*. There are two others which loſe themſelves at the bulb of the Urethra, one of which goes to the ſpongious part of the Bulb, and the other to the Muſcle which covers it. There is a third which penetrates the Corpus Cavernoſum of the ſame ſide, and ſometimes even a fourth which runs upon the Penis to form the Inguinalis Externa, which I have before deſcribed.

The *Iliaca Externa* does not furniſh conſiderable branches, except at its paſſage thro' the arch of the Abdominal Muſcles, where it furniſhes two, which may be diſtinguiſhed into internal and external; the internal branch, called the *Epigaſtric Artery*, aſcends obliquely, paſſing in man behind the cord of the ſpermatic veſſels, and in women behind the *Ligamenta Rotunda*, afterwards paſſes thro' the Aponeuroſis of the tranſverſe muſcle towards the poſterior part of the *Muſculus Rectus*, into which it enters about two or three fingers breadth above the *Os Pubis*, and continues along the poſterior ſurface of this muſcle, running into branches upon the Aponeuroſes of the adjacent muſcles, and at laſt loſes itſelf by communicating with the *internal Mammary Artery*. The external branch runs towards the creſt of the *Os Ileum*,

Ileum, to be diſtributed to the *Muſculi Tranſverſales* and *Obliqui*.

The *Arteria iliaca externa* having paſſed under the arch of the Abdominal Muſcles to be continued along the thigh, loſes its name of *Iliac*, and aſſumes that of *Crural*. This Artery upon its coming out of this arch furniſhes three ramifications, one of which is diſtributed to the inguinal glands and the external parts of generation; this branch is called *Inguinalis Cutanea*. Of the other two, one goes to the *Pectinæus Muſcle*, and the other to the ſuperior part of the Sartorius. The Crural Artery furniſhes afterwards, a little below theſe ramifications, three conſiderable branches called Muſcular Arteries, which are diſtinguiſhed into external, middle, and internal. Theſe three branches ſometimes riſe from the Crural Artery by a common trunk, and ſometimes by two.

The external branch is diſtributed to the ſuperior parts of the *Muſculus Cruralis*, of the *Vaſtus Externus*, of the *Gracilis Anterior*, of the *Faſcia Lata*, and of the *Sartorius Medius*, and alſo furniſhes a branch which runs to the point of the *Great Trochanter*, in order to communicate with the *Sciatic Artery*, and even ſometimes with the *Inguinalis Communis*.

The middle branch deſcends on the internal part of the thigh between the *Triceps* Muſcles, to which it is diſtributed, and having pierced the ſecond of theſe muſcles, it furniſhes branches to the inferior part of the *Glutæus Major*, to the *Semi-nervoſus*, to the *Semi-membranoſus*, and to the *Biceps*.

The internal branch runs backwards towards the Trochanter Major, and furniſhes ramifications to the *Muſculi Quadrigemini* and to the poſterior muſcles of the thigh.

The Crural Artery, from the arch of the Abdominal Muſcles to about five or ſix fingers breadth below, is ſituated at the anterior and ſomewhat internal part of the thigh, being only covered with the ſkin, the fat, and the Aponeuroſis of the *Faſcia Lata*, and with ſome Conglobate Glands; and in proportion as it approaches the ham, it is covered with the adjacent muſcles. It is alſo covered at firſt with the Sartorius Muſcle, and afterwards paſſes thro' the *Triceps inferior* to reach the ham; ſo that almoſt from the anterior part of the thigh, where this artery was firſt ſituated, it reaches its internal part, and afterwards the poſterior, in proportion as it approaches the ham.

The Crural Artery being arrived at the ham, where it is only covered with the ſkin and fat, loſes its name, and is called the Poplitean Artery. In this part it furniſhes two ramifications on each ſide, which are diſtributed to the lateral parts of the articulation. This Artery continues its courſe to the leg, paſſing between the *Gemini* Muſcles, the *Plantaris*, and the *Poplitæus*, to which it is diſtributed, and divides itſelf into two branches, one of which is anterior and the other poſterior. The anterior branch is call'd *Tibialis anterior*, pierces the interoſſeous ligament in its ſuperior part, deſcends along this ligament, and terminates at the upper part of the foot, paſſing under the common external annular ligament, and furniſhing in its courſe ramifications to the adjacent parts. Being arrived at the upper part of the foot it continues its road to the great toe, where it is divided into two principal ramifications, the moſt conſiderable of which runs to the ſole of the foot, paſſing thro' the muſcles which poſſeſs the ſpace between the two firſt bones of the *Metatarſus*, and communicates with the branch which I ſhall afterwards deſcribe. The ſecond branch is diſtributed to the great toe.

The

The poſterior branch, after having paſſed under the ham, is ſub-divided into two other branches, one of which is call'd *Arteria tibialis poſterior*, and the other *Arteria fibularis*. The former, which is the moſt conſiderable, deſcends along the poſterior internal part of the *Tibia*, advances to the *Malleolus internus*, is diſtributed in this courſe to the adjacent Muſcles, and even furniſhes a pretty conſiderable branch which paſſes thro' the duct, which is obſervable at the poſterior and almoſt ſuperior part of the *Tibia*, and which penetrates into the medullary duct. This branch being arrived behind the *Malleolus internus* ſlips under the ſole of the foot, paſſing between the *Thenar Muſcle* and the concave part of the *Calcaneum*, at which part it is divided into two principal ramifications, of which the moſt conſiderable, call'd *Plantaris externa*, runs to the external ſide of the ſole of the foot, and advances to the anterior extremity of the fifth bone of the *Metatarſus*, whence it runs tranſverſely to the firſt of theſe bones forming a kind of arch, from which ariſe the branches which go to the toes, and is at laſt inoſculated with the branch which has paſſed over the foot between the firſt and ſecond bones of the *Metatarſus:* The ſecond branch, call'd *Plantaris internus*, having arrived beyond the middle of the ſole of the foot is divided into two ſmall branches, one of which goes to the great toe and communicates with a branch of the *Arteria tibialis anterior*, and the other is diſtributed to the firſt Phalanges of the other two

The ſecond branch, call'd *Fibularis*, deſcends along the poſterior ſurface of the *Fibula*, being ſituated between the *Muſculus Solaris* and the flexor of the great toe, to which it furniſhes branches, and arriving at the anterior part of the leg it croſſes the interoſſeous ligament to paſs to the poſterior part of the foot, and is principally diſtributed to the

Tarſus

Tarſus where it terminates. This branch communicates in its road with the *Tibialis poſterior.*

I ſhall ſay nothing of the numerous communications which the Arteries have with each other, and which are eaſily diſcover'd by the help of injections, or by a dexterity and patience equal to thoſe of *Euſtachius*, a celebrated Roman Anatomiſt who lived in 1552, as we may judge by ſome of his beautiful anatomical tables.

CHAP. II.

Of the Veins in general.

THE Veins are thoſe veſſels which return from all the parts to the Heart, a portion of the blood diſtributed to theſe parts by the Arteries.

The Veins begin where the Arteries end, and may be conſider'd as continued Arteries. At their beginning they are only ducts of an indefinite ſmallneſs, and of the union of ſeveral branches with each other; there are trunks form'd of a conſiderable bulk which is augmented in proportion as they recede from their origin and approach to the Heart.

The Veins have no apparent motion, and there are in their cavities membranes diſpoſed like ſuckers or valves, which facilitate the courſe of the blood to the Heart and hinders its return to the extremities.

The figure of theſe valves is ſemilunar. They are only adherent by their convex edge, while that which is concave is turned towards the Heart. Theſe valves are ſometimes ſingle, and at other times there are two or three of them found together.

The Veins are thinner than the Arteries, for which reaſon the Antients believed that they were

only form'd of a ſimple membrane or coat, and that the Arteries were compoſed of two. But the Moderns have diſcover'd, that the Veins are nearly compoſed of the ſame coats as the Arteries, with this difference however, that thoſe of the Veins are more ſlender and have not the ſame arrangement. The firſt of theſe coats is membranous, being only form'd of ſeveral filaments generally extended according to the length of the Vein. The ſecond is vaſcular, the third glandular, and the fourth is compoſed of ſeveral annular fibres, which, according to ſome, are muſcular. Theſe different coats of the Veins are generally ſhewn on the *Vena Cava* of an ox, whoſe thickneſs renders the demonſtration of theſe membranes more eaſy.

'Tis to be obſerved in general, that all the Arteries are in their diſtributions accompanied with as many Veins, and that moſt frequently there are two Veins for one Artery. This does not hold true of the Veins, ſince we find ſeveral of them which are not accompanied with any Artery. Such for ordinary are the external Veins of the Arms and Legs, *&c.* Hence we ſee that the ramifications of the Veins are more numerous than thoſe of the Arteries. We alſo obſerve, that the trunks and principal branches of the Arteries, as well as the Veins, generally retain the ſame ſituation in all ſubjects, but that it is not ſo with reſpect to their ramifications, eſpecially thoſe of the Veins, ſince their ſituation varies greatly, not only in different ſubjects, but alſo in the correſponding members of the ſame ſubject.

There are three principal Veins in the human body, which are call'd *Vena Cava*, *Vena Portæ*, and *Vena Pulmonaris*.

ARTICLE I.

Of the Vena Cava.

THE *Vena Cava* comprehends two principal trunks, call'd the *Vena Cava ſuperior* and the *Vena Cava inferior*, or *Vena Cava deſcendens* and *Vena Cava aſcendens*, from the courſe of the blood which flows in their cavities. Theſe two principal trunks re-unite at the right auricle of the heart, and there diſcharge the blood they have received from the parts with which they communicate.

The *Vena Cava ſuperior*, or *deſcendens*, extends from the right auricle of the heart to the ſuperior part of the *Sternum*. There is a conſiderable Vein which diſcharges itſelf there, and which generally has no companion, for which reaſon the Greeks have call'd it *Azygos*, and the Latins *Vena ſine Pari*. The *Azygos* generally lies anteriorly along the lateral right part of the body of the vertebræ of the back, penetrates the cavity of the lower belly, paſſing between the two appendices of the diaphragm, and communicates with the right *emulgent* Vein. In its courſe it receives the eight inferior intercoſtals of each ſide, and even ſometimes the four ſuperior intercoſtals, as well as the two ſmall Veins which have received the blood of the bronchial Arteries.

The *Vena Cava ſuperior* ſeems to be form'd of two conſiderable branches call'd *Subclavians*, which appear to be compoſed of two other branches of Veins call'd Axillaries, which I ſhall afterwards deſcribe.

The ſubclavian Vein of the right ſide is ſhorter than that of the left, which depends on the ſituation of the *Vena Cava*, which does not correſpond to the middle of the body of the vertebræ, but to their right lateral part. They, however, receive the

blood from the ſame parts, and by Veins of the ſame names; only we obſerve, that the left ſubclavian receives the extremity of the thoracic duct, for we rarely find that this duct diſcharges itſelf into the two ſubclavians at the ſame time.

The Veins which diſcharge themſelves into the Subclavians receive their names from the Arteries which accompany them; for which reaſon they are call'd *internal Mammaries*, *Vertebrals*, *Thoracic*, and *ſuperior Diaphragmatics*; and moſt frequently the *ſuperior Intercoſtals* alſo diſcharge themſelves into the *Subclavians*.

The *Subclavians*, beſides theſe, alſo receive the jugular Veins, which are divided into *Internal* and *External*. The internal begin at the end of the lateral ſinuſes, deſcend along the anterior part of the neck at the ſide of the *Trachea Arteria* joining the Carotids, and terminate in the Subclavians. In their courſe they receive ſeveral branches of Veins, which eſtabliſh a communication not only between the two internal jugulars, but alſo between theſe and the *external Jugulars*.

The *external Jugulars* are ſituated along the lateral parts of the neck, being only covered with the ſkin, the fat, and the *cutaneous* Muſcles. They receive the Veins which bring back the blood from the face, from the external part of the Cranium, and from a part of the neck. Moſt of theſe Veins have particular names, or rather have the ſame names with the Arteries which they accompany, except the *Vena Præparata* which correſponds to the frontal Artery. The other Veins are on each ſide the *Temporal*, the *Occipital*, the *Angular*, the external *Maxillary*, the internal *Maxillary*, the *Ranine* or *Ranula*, &c.

The *temporal* Vein correſponds to the Artery of the ſame name, as well as the *Occipital*, the *Angular* to the Artery of the great angle of the Eye; the external

ternal *Maxillary* to the Artery which paſſes over the middle of the baſe of the inferior jaw; the internal *Maxillary* to the Artery diſtributed to the teeth, and the *Ranine* to the Artery which is diſtributed to the tongue, and which runs along its inferior part.

Theſe Veins alſo moſt frequently receive two branches call'd *Cervical*, which, from their ſituation, are diſtinguiſh'd into anterior and poſterior, the former being placed at the anterior, and the latter at the poſterior part of the neck. Sometimes theſe Veins diſcharge themſelves into the internal *Jugulars*.

'Tis to be obſerved, that the external Jugulars communicate with the ſinuſes of the Dura Mater by ſome of the Veins which diſcharge themſelves there, as by the *Angular*, the *Temporal*, the *Occipital*, &c.

The *axillary* Veins diſcharge themſelves into the Subclavians, paſſing between the *Clavicle* and the anterior *Branch* of the *Muſculus Scalenus*. They receive ſeveral Veins which bear the ſame names as the Arteries which they accompany; namely, the *Scapularis interna*, the *Scapularis externa*, the *Mammaria externa*, and the *Humoralis*. Laſtly, they receive the blood from all the ſuperior extremity by ſeveral Veins which may be diſtinguiſhed into two claſſes. The firſt comprehends thoſe which in their road are not generally accompanied with any Artery. The ſecond includes thoſe which accompany the Arteries, and moſt frequently there are two Veins for one Artery. The Veins of the firſt claſs are outermoſt, being only cover'd with the ſkin and fat. The ſecond, on the contrary, lye deeper, except at the parts where I have ſaid the Arteries are ſuperficial, as in the armpits, along the internal part of the arm, in the inferior part of the radius, *&c.*

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The Veins which accompany the *Arteries* communicate in ſeveral parts with the external Veins, as at the flexure of the Elbow, the Wriſt, *&c.*

Moſt of the external Veins have received particular names. The Vein obſerved on the hand, between the ring finger and the little finger, is call'd the *Salvatella.* That which runs along the thumb is by ſome call'd *Cephalica Pollicis.* The *Radiales* and *Cubitales* are thoſe which run along the *Os Cubiti* and the *Radius.* The *Radiales* re-unite at the top of the internal and ſuperior part of the fore arm, and compoſe the cephalic Vein which aſcends along the external part of the arm, and reaches the line which ſeparates the *deltoide* and *pectoral* Muſcles, in order to diſcharge itſelf afterwards into the Subclavian.

The *cubital* Branches re-unite at the top of the internal and poſterior part of the fore arm, and compoſe the *Baſilic* Vein, which at the flexure of the Elbow communicates with the *Cephalic* by one, and ſometimes two oblique branches call'd the *Median Veins.* Moſt frequently there is a pretty conſiderable branch call'd the *Cubital,* ſituated more poſteriorly than the *Baſilics.* Theſe two Veins reach the internal part of the arm, to diſcharge themſelves into the Veins which accompany the brachial Artery, and altogether form at the upper part of the arm one trunk call'd the *Axillary* Vein.

The *Vena Cava inferior* or *Aſcendens* reaches from the fourth Vertebra of the loins to the right Auricle of the heart. It lies along the lateral right part of the body of theſe Vertebræ, and in proportion as it approaches the Diaphragm, it runs more to the right to reach the poſterior part of the liver. and paſſes thro' the right ſide of the Diaphragm in its aponeurotic portion, commonly called its *Nervous Center.* Laſtly, it penetrates the *Pericardium* to reach the heart. The Vena Cava in this courſe receives ſeveral

ral Veins, which carry back the blood from the adjacent parts; ſuch as the *Phrenic* which comes from the Diaphragm, the *Hepatic* from the liver, the *Emulgent* from the kidneys, the *Adipoſe* which returns from the pinguious coverings of the kidneys, the *Capſularies* which return from the Capſulæ Atrabiliares, and the *right Spermatic*, which in man comes from the *right Teſticle*, from the *Epididymis*, and from its coverings, and in woman from the *Ovary* and *Fallopian Tube* on the right ſide. The *left Spermatic* diſcharges itſelf, as I have elſewhere obſerved, into the *Emulgent* of the ſame ſide. Beſides theſe, the Vena Cava receives the *Lumbar* Veins which accompany the Arteries of the ſame name. Laſtly, it receives the Iliacs, of which it only ſeems to be a continuation, and in the angle formed by the union of the *Iliacs* the *Venæ Sacræ* diſcharge themſelves, which return from the *Os Sacrum*, and from the adjacent nerves and membranes.

In the beginning of the *Vena Cava Inferior*, near the heart, we find a Valve pretty like thoſe of the other Veins, called the Valve of *Euſtachius*. I have ſpoke of it in treating of the Fœtus. It adheres to the anterior ſide of this veſſel, and poſſeſſes the half of its diameter. The ſubſtance of this Valve is ſometimes reticular, inſtead of being membranous.

The *Iliac Veins* are compoſed of two branches, as well as the Arteries of the ſame name, and theſe branches are diſtinguiſhed into external and internal; the internal *Iliac*, called the Hypogaſtric, receives at leaſt as many branches of Veins as the Artery of the ſame name has furniſhed arterial branches, and all theſe different branches accompany each other in their diſtributions. The ſame holds true of the *external Iliac*, that is to ſay, it follows the courſe of the Artery of the ſame name, and the different branches

branches which diſcharge themſelves in it, accompany the arterial ramifications.

The *External Iliac Vein* is continuous with another called the *Crural*, which follows the road of the Artery of that name, that is to ſay, it paſſes under the arch of the Abdominal Muſcles, and receives not only the branches of the Veins which have accompanied all the ramifications of the *Crural* Artery, but alſo ſeveral others which are accompanied with no Artery at all, which has laid a foundation for diſtinguiſhing the Veins of the inferior extremities into two claſſes, as well as thoſe of the ſuperior extremities. The firſt comprehends thoſe Veins which are generally accompanied with no Artery, and under the ſecond are included thoſe which accompany the Arteries: theſe laſt are more numerous than the firſt, ſince there are generally two Veins for one Artery. The firſt are outermoſt, being only covered with ſkin and fat; the ſecond lies deeper, except in the parts where I have ſaid the Artery is ſuperficial, as in the ſuperior part of the thigh, the ham, *&c.*

The Veins which accompany the Arteries communicate in ſeveral parts with the external Veins, as at the Ham, the Sinuoſity of the Calcaneum, *&c.*

Moſt of the external Veins have received particular names, as the *Saphena externa*, the *Saphena interna*, and the *Suralis*. The *Saphena interna* is that pretty conſiderable branch which generally lies on the *Malleolus internus*, and which appears to be formed of ſeveral branches which run upon the ſuperior and internal part of the foot. The Vein is continued along the lateral internal part of the leg, and diſcharges itſelf into the Veins which accompany the Crural Artery at the ham. It appears to be formed of the ramifications which run over the ſuperior and poſterior part of the foot. The *Suralis* runs along the leg, and diſcharges itſelf at the

ham into the Veins which accompany the crural Artery.

The Veins which have accompanied the crural Artery in the leg and foot re-unite at the ham, to form but one and ſometimes two large branches, call'd the *crural Veins*, which continue to accompany the *crural Artery* advancing to the top of the thigh, where theſe Veins generally compoſe but one trunk which unites with the external Iliac. This trunk is call'd the *Vena Cruralis*, which receives the blood from all the inferior extremities, and from a portion of the abdominal Muſcles.

'Tis to be obſerv'd, that the *Vena Cruralis*, at the top of the thigh, is ſituated at the ſide of the Pubis, and at the internal ſide of the Artery, covering it however a little, and it retains this ſame ſituation to about three fingers breadth below the Groin, where the crural Artery becomes anterior to the Vein, and continues ſo till their paſſage thro' the *Muſculus triceps inferior* *.

The *Vena Cava* carries back into the right auricle of the heart, all the blood furniſh'd to it by the different branches and ramifications of the Veins which I have deſcribed.

Tho' the Veins ſeem to have no motion, yet there are caſes in which ſome of theſe veſſels, and eſpecially the external Jugulars move as ſenſibly as the Arteries †.

* See *Morgagni* advers. Anat. 11. Animadv. 45.

† See *Lanciſi* de motu cord. & aneuriſmat. & M. *Morand* on ſome accidents in the organs of circulation. Memoirs of the Royal Academy of Sciences, 1732.

ARTI.

ARTICLE II.

Of the Vena Portæ.

THE *Vena Portæ* is a trunk of a pretty conſiderable vein, formed by two principal branches, of which the one receives the blood which returns from the ſpleen, the pancreas, and a part of the ſtomach, and this branch is call'd the *Splenic Vein.* The other receives that which returns from the inteſtines and meſentery, and this is call'd the meſenteric Vein. This trunk of the Vein penetrates the ſubſtance of the Liver in its concave part, and before its entry it forms, as it were, two other branches, the one to the right and the other to the left. The diviſion of the trunk of this Vein into theſe two branches is call'd the *Sinus* of the *Vena Portæ.*

All the Veins which diſcharge themſelves into the *Vena Portæ*, whether into its trunk or into its branches, correſpond to the ramifications of the *Cæliac Artery*, of the *ſuperior Meſenteric*, and of the *inferior Meſenteric.*

The Veins which diſcharge themſelves into the trunk of the *Vena Portæ*, have the ſame names with the Arteries which they accompany. There are five principal ones of them; namely, the *Pyloric*, which riſes from the *Pylorus*; the right *Gaſtro-epiploic*, which riſes from the right and inferior part of the bottom of the ſtomach, and from the portion of the Epiploon which adheres to it; the *Inteſtinal* or *Duodenal*, which comes from the *Duodenum*; and the two *Cyſtics*, which riſe from the *Gall-bladder.*

The Veins which diſcharge themſelves into the ſplenic branch, alſo bear the ſame names with the Arteries which they accompany. There are ſeveral of them, namely, the *Stomachica Coronaria*, which comes from the ſuperior orifice of the ſtomach;

the left *Gaſtro-epiploic*, which comes from the left and inferior part of the bottom of the ſtomach, and from the portion of the epiploon which adheres to it; the *Epiploic*, which comes from the *Epiploon* and the *internal Hemorrhoidal*, or the *inferior Meſenteric*, which comes from the *Inteſtinum Rectum*, and even from a large portion of the *Colon*, for which reaſon ſome call this the *Colo-hæmorrhoidal Vein*. Beſides theſe, the *ſplenic Vein* receives the Veins, which, as well as the Arteries they accompany, are call'd the *Vaſa Brevia*, and thoſe which come from the *Pancreas* call'd *Pancreatic*.

The *Meſenteric Branch*, by ſome call'd the ſuperior *Meſenteric*, receives principally the Veins which have accompanied the different ramifications of the *ſuperior meſenteric Artery*; and the different branches which diſcharge themſelves into this Vein, communicate with thoſe of the *inferior Meſenteric*.

As the *Vena Portæ* enters into the Liver, we need not be ſurpris'd if perſons who have any obſtruction in this organ, are ſubject not only to the internal Hæmorrhoids, but alſo to the Dropſy *Aſcites*. In a word experience proves, that when the courſe of the blood is retarded in one part, its ſeroſity filtrates into the ſubſtance of that part, and is even ſometimes extravaſated into it, if the part forms a cavity. The œdematous inflation which happens in the legs and thighs of pregnant women towards the end of geſtation, is a proof of the infiltration of this ſeroſity, and the Dropſy Aſcites, which ſucceeds a ſcirrhus of the Liver, proves the extravaſation of it.

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SECTION IV.

Of NEUROLOGY.

ARTICLE I.

Of the Nerves in general.

NEUROLOGY is that part of Anatomy which treats of the Nerves.

The Nerves are cords form'd by the aſſemblage of ſeveral filaments, which proceed from the Medulla Oblongata included in the Cranium; and from that contained in the vertebral duct, commonly call'd the *Medulla Spinalis*, and which are diſtributed to all the parts of the body.

Tho' the different filaments which compoſe the Nerves have no apparent cavity, yet moſt phyſicians agree that they are hollow, or at leaſt diſpoſed in ſuch a manner that they ſuffer a ſpirituous fluid which comes from the Brain, the Cerebellum, *&c.* to paſs thro' their ſubſtance, which being diſtributed thro' all the parts of the body, ſerves principally to their motion and ſenſation.

The Nerves are diſtinguiſhed into two claſſes. The firſt comprehends thoſe which derive their origin from the Medulla Oblongata; and under the ſecond are included thoſe which come from the *Medulla Spinalis*. Ten pair of Nerves ariſe from the *Medulla Oblongata*, and thirty from the *Medulla Spinalis*. Theſe laſt are call'd *Vertebrals*, to which we ought to add the *Acceſſory* of *Willis*, or the companions of the eighth pair. But to all theſe different Nerves we ought to add two others, which extend

anteriorly along the Vertebræ from the head to the extremity of the *Os Sacrum*. Theſe are call'd *intercoſtal* Nerves, and in their road communicate with all the vertebral Nerves, and at their communication there are as many eminences or tubercles whoſe colour and conſiſtence pretty much reſemble thoſe of the Nerves. Theſe eminences are generally call'd *Ganglions*. The moſt conſiderable lies anteriorly on the root of the tranſverſe Apophyſis of the firſt Vertebra of the Neck, having a pretty oblong figure and a ſoftiſh conſiſtence. At the beginning of the vertebral Nerves we alſo find *Ganglions*, but theſe are ſmaller than that I have mentioned, and at the ſame time of an irregularly round figure. Beſides theſe *Ganglions* there are alſo ſome others, which I ſhall afterwards mention.

By diſſections we have diſcover'd that *Ganglions* are principally compoſed of nervous Fibres, and ſome others more conſiderable and appear fleſhy; the whole are interſpers'd with a number of blood-veſſels, and cover'd with the Pia Mater and the Dura Mater *. We may therefore conceive the Ganglions to be form'd by the different interlacement of the Nerves, which are either diſtributed to theſe eminences or ariſe from them. Some imagine, that the Ganglions are to the Nerves, what the conglobate Glands are to the lymphatic Veſſels, that is to ſay, that they ſecure in their road the different Nerves which either terminate in, or ariſe from them. Mr. *Winſlow* looks upon the Ganglions of each intercoſtal Nerve as ſo many origins of theſe Nerves, and conſequently as ſo many ſmall brains.

We obſerve, that the two cords which compoſe the eighth pair of Nerves, which come from the Medulla Oblongata, communicate with each other

* See Mr. *Morgagni* in Diſſert. de gangliorum Structura & uſu, by M. *Lanciſi*.

by

by ſeveral ramifications; and that they do the ſame in ſeveral parts with the ramifications of each intercoſtal Nerve, and form particular interlacements, call'd *Plexus*. They are call'd *gangliform Plexus*, when at the center of the interlacement of the nervous ramifications, there is a kind of Node in form of a *Ganglion*.

ARTICLE II.

Of the Nerves in particular.

THE firſt pair of Nerves from the *Medulla Oblongata* is that of the *Olfactories*, which riſe from the anterior and inferior part of the grooved bodies, come from the Cranium thro' the holes of the Ethmoide Bone, and ſpread themſelves on the membrane which covers the ſpongious Laminæ of the Noſe for the ſenſe of ſmelling.

Theſe Nerves are enlarg'd as they approach the *Os Ethmoides*, and their filaments in paſſing thro' the Lamina Cribriformis are each included in ſo many ſheaths of the Dura Mater.

The ſecond is the Par Opticum, which ſeem to derive their origin from the *Thalami Nervorum Opticorum*, and coming out of the Cranium thro' the *Foramina Optica* they loſe themſelves in the eye, where, by their ſpreading, they form the membrane call'd the *Retina*.

Theſe Nerves in their beginning unite with each other before the Infundibulum, and even croſs each other, according to the obſervations of Mr. *Petit*. They do not pierce the poſterior part of the Eye, oppoſite to the *Pupilla*, but a little lower, and towards the internal ſide.

The third pair is that of the *Motores Oculorum*; they ariſe from the anterior edge of the annular eminence, come out of the Cranium thro' the *Sphenoidal*

Fiſſure, and are divided into four branches, one of which is diſtributed to the *Muſculus Elevator Oculi*, and furniſhes filaments to the *Elevator Palpebræ*. The three others go to the muſcles of the eye, call'd *Depreſſor*, *Adductor*, and *Obliquus Minor*. But beſides theſe branches, this pair furniſhes one very ſmall and ſhort, which moſt frequently comes from the branch diſtributed to the *Opticus Minor*. This ſmall branch forms at firſt a ſmall Centicular *Ganglion*, which ſends ſeveral very fine filaments round the Optic Nerve, which after having pierced the *Tunica Sclerotica*, afterwards ſlip between this membrane and the Choroide as far as the *Iris*, and are there diſtributed by very ſlender ramifications. This *Ganglion* alſo furniſhes other filaments, which communicate with the naſal ramification of the *Ophthalmic Branch*, which I ſhall afterwards deſcribe.

The fourth pair is that of the *Pathetic Nerves*, which riſe behind the eminences called *Teſtes*, from the medullary expanſion called the *Valve* of Mr. *Vieuſſen*, come from the Cranium thro' the *Sphenoidal Fiſſure*, and loſe themſelves in the muſcle of the eye called *Obliquus Major*.

The fifth derives its origin anteriorly from the lateral parts of the annular eminence by ſeveral filaments, which form two large and ſomewhat flat trunks. Each of theſe trunks is divided into three large branches, diſtinguiſhed into anterior, middle, and poſterior.

The anterior, called *Ophthalmic*, advances to the *Sphenoidal* Fiſſure to enter the *Orbit*, communicates in this paſſage by a filament or two with the ſixth pair, and by that means concurs to the formation of the *Intercoſtal Nerve*. It is afterwards divided into three branches called *Frontal*, *Naſal*, and *Lachrymal*. The Frontal Branch riſes from the orbit thro' the *Foramen Superciliare*, and loſes itſelf in the orbicular muſcle

muſcle of the eye-lids and in the Frontal Muſcle: the Naſal Branch, after having by one or two filaments communicated with the lenticular ganglion of the third pair, is divided into two other branches, one of which enters into the Cranium, paſſing thro' the internal Orbitary, and comes out of it again thro' the holes of the Cribriform Lamina of the Os Ethmoides, to loſe itſelf on the Pituitary Membrane which covers the Cellules of that bone: the other branch reaches the great angle of the eye, to be diſtributed to the Lachrymal Sack and parts adjacent. The third ramification of the *Ophthalmic* Branch, called *Lachrymal*, loſes itſelf in the *Lachrymal Gland.*

The middle branch, called the *Superior Maxillary*, comes from the Cranium thro' a hole of the Sphenoide, to which it gives its name, and is divided into two principal ramifications, which may be diſtinguiſhed into ſuperior and inferior; the ſuperior enters the orbit thro' the *Spheno maxillary* Fiſſure, and after having ſent a filament, which paſſes thro' the ſmall hole of the cheek-bone, to be diſtributed to the adjacent parts, it inſinuates itſelf into the duct formed along the inferior part of the orbit, called the *Superior Maxillary*. In this courſe it furniſhes filaments to the roots of the anterior *Molary* Teeth, and to thoſe of the *Canini* and *Inciſores*, and again comes out of this duct to be diſtributed to the orbicular muſcle of the orbit, to thoſe of the noſe, and to thoſe of the lips which are adjacent.

The inferior ramification, called the *Palatine*, deſcends along the *Pterygoide Apophyſis* to reach the palate, paſſing thro' the canal formed by the union of this Apophyſis with the *Maxillary Bone* and that of the palate. In this paſſage it furniſhes filaments, which inſinuate themſelves into ſmall holes formed in the external ſurface of the ſuperior Maxillary Bone, to be diſtributed to the poſterior Molary Teeth.

Teeth. The *Palatine* Branch before arriving at the palate is divided into two other branches, one of which paſſes thro' the *Palatino-ſphenoidal* Hole, to be diſtributed in the internal part of the noſe, to the *Sphenoidal Sinus*, and the *Euſtachian Tube*. The ſecond continues its road in the duct where it is lodged, and it comes out of it thro' the *Foramen Guſtatorium*, which terminates this duct, and is diſtributed to the glandular membrane of the palate, to its fleſhy portion called the Vail of the Palate; ſome fibres even advance to the *Foramen Palatinum Anterius*.

The third, and at the ſame time the moſt conſiderable branch of the fifth pair, is called the *Inferior Maxillary:* it comes out of the Cranium thro' a hole of the ſame name, and immediately after ſends out three or four ſhort branches, which are diſtributed to the adjacent muſcles. This branch is afterwards divided into two principal ramifications; the firſt is inſinuated into the inferior maxillary duct, and in paſſing thro' it is diſtributed to the teeth of the inferior jaw, and afterwards comes out of it thro' the *Foramen Maxillare* to loſe itſelf in the inferior lip. The ſecond of the principal branches runs to the tongue, in which it is diſtributed, advancing to its point; it alſo furniſhes ſome filaments to the muſcles of the *Os Hyoides*. This ramification is called Lingual, to diſtinguiſh it from that which enters into the duct of the inferior jaw, called the *Inferior Maxillary*. This branch, I ſay, before it is diſtributed to the tongue, ſends a ſmall branch which aſcends backwards to reach the *Euſtachian Tube*, accompanying, as I have ſaid, the external or anterior muſcle of the Hammer, and afterwards to inſinuate itſelf into the caſe of the Drum, which it runs thro', paſſing between the long branch of the Anvil and the handle of the Hammer, and communicates with the hard portion of the ſeventh pair. Mr. *Winſlow* thinks, that this

ſmall branch comes from the hard portion of the ſeventh pair, to be diſtributed to the tongue.

The ſixth pair riſes from the poſterior part of the annular eminence, advances to the *Sella Sphenoidalis*, to the ſide of which the internal Carotid Artery adheres, and in this part communicates by one or two very ſhort filaments with the Ophthalmic Branch. Immediately and behind this communication it furniſhes a branch, running from before backwards, ſinks into the duct thro' which the *Carotid* paſſes immediately at the ſide of this artery. This branch, which is ſometimes double, is commonly taken for the root or origin of the *Intercoſtal Nerve*. The ſixth pair afterwards paſſes into the orbits thro' the Sphenoidal Fiſſure, and loſes itſelf in the Abductor Muſcle of the Eye.

The ſeventh is the *Par Auditorium*, which derive their origin from the lateral and poſterior part of the annular eminence. Each of theſe nerves is divided into two cords, which accompany each other at a very ſmall diſtance.

Theſe are generally called the portions of the Auditory Nerves, and are from the degrees of their conſiſtence diſtinguiſhed into the hard and the ſoft portion; the firſt, which is the ſmalleſt, is placed anteriorly, and the ſecond is ſituated behind. Theſe two portions run into the internal *Foramen Auditorium*. The ſoft penetrates the Labyrinth by ſeveral ſmall holes which correſpond to it, and loſes itſelf in the different parts which compoſe it, as I have elſewhere obſerved. The hard portion, by Mr. *Winſlow* called the *Small Sympathetics*, inſinuates itſelf into a winding duct formed in the thickneſs of the ſtony Apophyſis, which begins in the bottom of the *Foramen Auditorium Internum*, and its external orifice is between the *Styloide* and *Maſtoide* Apophyſes, for which reaſon this orifice is called *Foramen Stylomaſtoideum*. This duct is called the *Aqueduct* of *Fallopius*.

lopius. The hard portion before leaving this duct, communicates with the branch called *Chorda Tympani*, and when come out of it ſends ſome filaments to the external ear, and goes afterwards forwards to paſs thro' the Parotid Gland, ſending ſeveral filaments to it. It is divided into two large branches, one of which is ſuperior and the other inferior.

The ſuperior is divided into ſeven or eight branches, which are ſpread ſuperficially like irregular rays in the lateral parts of the face. Theſe branches moſt frequently communicate with the *Frontal* and *Maxillary* Branches of the fifth pair. In certain ſubjects we obſerve, that theſe branches at their firſt diviſion form a kind of *Plexus*, which reſembles a *Gooſe's Foot.*

The inferior branch runs under the angle of the inferior jaw, and is diſtributed by ſeveral ramifications to the lateral inferior parts of the face, and to the adjacent parts of the throat, and terminates there principally by a great number of cutaneous filaments. Two or three ramifications of this branch communicate with ſome of thoſe of the inferior Maxillary of the fifth pair, which come out of the inferior Maxillary Duct through the *Foramen Mentoſum.*

The eighth pair, which the ancients have called *Par Vagum*, and which Mr. *Winſlow* calls the *Middle Sympathetic Nerves*, comes from the anterior part of the *Corpora Olivaria*, and comes out of the Cranium thro' the anterior part of the Foramina Lacerata. This paſſage is diſtinguiſhed from that of the *Lateral Sinuſes*, by a membranous partition of the *Dura Mater.* This pair, at its coming out of the Cranium, receives a ſmall branch of a nerve which comes from the Medulla Spinalis, as I ſhall ſhew in deſcribing it. This ſmall cord is called the *Nervus Acceſſorius Octavi Paris.* or *Nervus Spinalis.*

The

The eighth pair in coming out of the Cranium is adherent not only to the ſpinal nerve, but alſo to the ninth pair, and to the firſt *Ganglion* of the *Intercoſtal*. The firſt branches which the eighth pair furniſhes go to the adjacent muſcles of the root of the tongue, to thoſe of the Pharynx, and to the tongue itſelf, where it communicates with the Nerves of the fifth and ninth pairs which are diſtributed there. The other branches go to the Larynx and its muſcles.

The eighth pair deſcends before the firſt *Ganglion* of the *Intercoſtal*, along the neck at the ſide of the Carotid Artery, and of the internal jugular vein. In this paſſage it ſends very fine filaments to the adjacent parts. The eighth pair afterwards enters the breaſt before the riſe of the Subclavian Arteries, and ſlips behind the lungs to reach the Œſophagus. The trunk of the eighth pair on the right ſide, in paſſing before the Subclavian Artery, furniſhes a branch which winds backwards under this artery, making a kind of ſling, and aſcends along and at the ſide of the *Trachea Arteria*, ſending filaments to it as well as to the Œſophagus, and advances to the Larynx. This branch is called the Recurrent Nerve, which arriving at the Larynx ſends branches to its muſcles, to the *Pharynx*, and to the Thyroide Glands.

The trunk of the eighth pair of the left ſide alſo furniſhes a branch of the *Recurrent Nerve*, which paſſes under the croſs of the Aorta, and is diſtributed to the Trachea Arteria and to the Œſophagus, advancing to the Larynx, where it terminates in the ſame manner as the *Recurrent Nerve* of the right ſide.

To the parts whence the Recurrent Nerves derive their origin the cords of the eighth pair ſend ſeveral filaments, which join with ſome others furniſhed by the two Intercoſtal Nerves, and all of them run obliquely to the heart, croſſing each other, and even

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for the moſt part uniting, and by this means form a *Plexus* called *Cardial*, which produces a great number of filaments, ſome of which go to the Pericardium, and others paſs thro' it to be diſtributed to the heart and its Auricles.

The cords of the eighth pair paſs afterwards behind the lungs, furniſhing to each ſeveral branches, which run croſſing each other over the beginning of the Bronchia, and compoſe the Pulmonary Plexus, whoſe filaments accompany the Bronchia in their diſtribution thro' the lungs.

The two cords of the eighth pair, after having furniſhed branches to the lungs, approach to the Œſophagus, and in proportion as they deſcend the cord of the right ſide, runs along the poſterior part of the Œſophagus, and that of the left ſide along its anterior part, each of them furniſhing on this duct ſeveral ramifications, which croſſing each other and even uniting, form a kind of Plexus. Laſtly, theſe cords arriving near the Diaphragm, accompany the Œſophagus in its paſſage thro' this fleſhy partition. The anterior, which is a continuation of the left cord, is ſpread over the ſuperior, commonly called the anterior ſurface of the ſtomach; and the poſterior cord, which is the continuation of the right cord, is ſpread over the inferior, commonly called the poſterior ſurface of the ſtomach.

The ramifications of both theſe cords are interlaid and united in ſeveral parts, principally round the ſuperior orifice of the ſtomach, and along its ſmall curvature to the Pylorus, whence there reſults a kind of net-work called *Plexus Coronario-ſtomachicus*; and the two cords loſe themſelves in the union of the Intercoſtal nerves, to concur with them for the formation of the *Hepatic*, *Splenic*, and *Renal Plexus*, &c.

The Intercoſtal Nerves called *Sympathetici Majores* are two pretty ſlender cords, which are commonly thought

thought to derive their origin from each ſide by three filaments of Nerves; namely, two from the *Ophthalmic* Branch of the fifth pair, and one of the ſixth. They come out of the Cranium, thro' the ducts which have afforded an entry to the internal carotid Arteries, deſcend anteriorly along the Vertebræ of the Neck, Back and Loins, to reach the inferior part of the *Os Sacrum*, where they terminate. Theſe Nerves, in all this paſſage, are ſituated along the lateral parts of the bodies of the Vertebræ, immediately over the root of their tranſverſe Apophyſes, and communicate with all the Ganglions of the vertebral parts by ſo many filaments which terminate in their poſterior parts. They alſo communicate with ſome of the pairs of the Medulla Oblongata, and eſpecially with the eighth pair. 'Tis to be obſerv'd, that in the parts where the intercoſtal Nerves receive the filaments of communication from the vertebral pairs, there are as many Ganglions of a more or leſs conſiderable bulk; and from theſe eminences riſe the branches which theſe Nerves furniſh by their anterior part to be diſtributed to the adjacent parts.

Anatomiſts have always regarded the communication of the intercoſtal Nerves with the fifth and ſixth pairs of the Medulla Oblongata, as the origin of the Nerves. But Mr. *Petit* has demonſtrated by ſeveral particular obſervations *, that theſe Nerves terminate in the fifth and ſixth pairs of the Medulla Oblongata, inſtead of deriving their origin from it. Mr. *Winſlow* thinks, that the Ganglions diſperſed thro' all the extent of the intercoſtal Nerves are the origins of theſe Nerves, conſidering theſe eminences as ſo many little brains.

The moſt conſiderable of theſe Ganglions is ſituated at the anterior part of the tranſverſe Apo-

* See Memoirs of the Royal Academy of Sciences, 1727.

phyſis

phyſis of the firſt Vertebra of the neck. It is call'd the ſuperior cervical Ganglion, to diſtinguiſh it from another which is ſituated lower, and which I ſhall afterwards deſcribe. This Ganglion is pretty ſoft, and by its ſuperior part receives the ſlender nervous cord, which I have ſaid communicates with the anterior branch of the fifth pair, and with the ſixth pair. This cord, in its paſſage thro' the duct of the temporal bone, furniſhes the carotid with filaments which croſs each other in embracing it, and form as it were a kind of plexus round that veſſel.

The ſuperior cervical Ganglion is ſtrongly adherent by ſeveral filaments of communication with the eighth pair, and alſo communicates on both ſides by very ſhort branches with the ninth and tenth pairs of the Medulla Oblongata; as alſo with the firſt, ſecond, and ſometimes the third cervical pairs, and in its paſſage ſends filaments to the Pharynx and adjacent Muſcles. Afterwards this Ganglion terminates below by a very ſmall cord, which deſcends anteriorly along the Muſcles which lye on the Vertebræ of the Neck; and in this courſe communicates with the third, fourth, fifth, and even pretty oft with the ſixth cervical pairs, by ſmall branches more or leſs oblique, with which it ſeems to be a little augmented in proportion as it deſcends.

The cord, or rather the trunk of the Intercoſtal, being arrived oppoſite to the laſt Vertebra of the neck, forms a ſecond Ganglion, call'd the *inferior Cervical.* Immediately after, the Intercoſtal turns from within outwards towards the root or the condyle of the firſt rib, and there it forms a third Ganglion call'd the *firſt Thoracic Ganglion.* Theſe two Ganglions are very near each other, being only ſeparated from each other by a portion of the trunk which is very ſhort, and ſometimes double, forming

ing in ſome ſubjects a ſmall Plexus behind the ſubclavian Artery. Theſe two Ganglions communicate by very ſhort branches with the ſixth and ſeventh of the cervical pairs; and the Thoracic Ganglion alſo communicates with the firſt dorſal pair. From the inferior cervical Ganglion, and even ſometimes from the Thoracic, there ariſe ſeveral branches, which uniting with the ſimilar ones of the oppoſite Intercoſtal, and with thoſe furniſhed by the eighth pair, form the *cardiac Plexus*. There are intercoſtal Filaments of each ſide which loſe themſelves in the *Pulmonary Plexus*.

The intercoſtal Nerve, after having ſent out theſe ramifications, continues its courſe in the breaſt, lying laterally on the bodies of the Vertebræ of the back, joining the Condyles of the ribs, forming between each rib a Ganglion which receives two filaments from each dorſal Nerve; and being arrived at the ſixth Vertebra of the back, the intercoſtal in deſcending, furniſhes five branches which run obliquely on the fore part, where they re-unite, forming by their union a ſingle cord, call'd the anterior Intercoſtal, to diſtinguiſh it from the true trunk of the Intercoſtal which is continued along the Vertebræ of the back and loins in order to reach the *Os Sacrum*, and which is call'd the poſterior Intercoſtal.

The *anterior intercoſtal Nerve* paſſes thro' the Diaphragm near its poſterior part, communicating in this paſſage with the diaphragmatic Nerve. After its entry into the lower belly, it produces immediately behind the *Capſula Atrabiliaris* a kind of irregular Ganglion, which is a little lengthened and incurvated, for which reaſon it is call'd the ſemilunar Ganglion. The convexity of this Ganglion is turned obliquely behind and below; and its concavity forwards and upwards.

The *Semilunar Ganglion* of the intercoſtal Nerve of the right ſide, communicates with the ſame Ganglion of the left Intercoſtal, and this communication is made behind the Stomach on the celiac Artery, to which theſe Ganglions furniſh ſeveral filaments, which by their intercroſſing form a kind of Plexus, call'd the *Celiac Plexus*. In this Plexus the two ſtomachic Nerves terminate, to concur to the formation of the *Hepatic*, *Splenic*, and *Renal Plexus*, &c.

The *Semi-lunar Ganglion* of the right ſide, together with ſome branches of the *Celiac* and *Stomachic* Plexus, form a particular interlacement, call'd the *Hepatic Plexus*, which runs to the Liver, embracing like a reticular ſheath, the Hepatic Artery and the Vena Portæ, and accompanies the diſtributions of theſe veſſels in the ſubſtance of this organ. This Plexus alſo furniſhes filaments to the Gall-bladder, to the Biliary Ducts, to the Duodenum, and to the Pancreas.

The *Semi-lunar Ganglion* of the left ſide, with ſome branches of the celiac and ſtomachic Plexus, forms a particular interlacement call'd the *Splenic Plexus*, which runs to the ſpleen like a reticular ſheath embracing the Splenic Artery, and accompanies the diſtribution of that veſſel in the ſubſtance of this Organ, and in the adjacent parts to which this Artery runs.

Each *Semi-lunar Ganglion* ſends from its convexity ramifications, which being join'd to the filaments of the firſt lumbal Ganglions form a particular interlacement, call'd the *Renal Plexus*, which embraces the emulgent Artery to follow it in all its diſtributions in the kidney, and it even furniſhes one or two filaments which accompany the ſpermatic veſſels. Mr. *Hunauld* has obſerved, in two different ſubjects, a pretty conſiderable branch of a Nerve, which roſe from the Semi-lunar Ganglion,

and aſcended from the lower belly to the breaſt to loſe itſelf in the right auricle, or in the baſe of the heart †.

The *Renal Plexus* of the right ſide communicates by ſome filaments with the *Hepatic Plexus*; and that of the left ſide does the ſame to the *Splenic Plexus*. Both of them alſo furniſh filaments which loſe themſelves in the *Plexus Meſentericus ſuperior*.

The *Plexus Meſentericus ſuperior* is principally form'd by ſeveral branches, furniſh'd by both the ſemi-lunar Ganglions at their union, which, by their different interlacement, form a kind of nervous ſheath to the meſenteric Artery, which accompanies it in all its diſtributions, even to the inteſtines.

The *Plexus Meſentericus inferior* is form'd by ſeveral parcels, which the *Plexus Meſentericus ſuperior* ſends downwards from its origin along the Aorta, and which, by their different interlacement, form a kind of nervous ſheath to the inferior Meſenteric Plexus, which accompanies it in all its diſtributions.

Theſe nervous parcels deſcending along the Aorta between the two Meſenteric Arteries, and which are call'd the poſterior Meſenteric Parcels, receive ſome filaments of communication from both the *Renal Plexuſes*. They alſo communicate with the trunks of the intercoſtal Nerves, commonly call'd, in the lower belly, *poſterior Intercoſtals*, by filaments which deſcend obliquely from the lumbal Ganglions, and they alſo ſend on both ſides a nervous filament which accompanies the ſpermatic veſſels.

'Tis to be obſerv'd, that theſe deſcending nervous Parcels, having produced the *Plexus Meſentericus inferior*, alſo ſend out other parcels lower, which deſcend upon the extremity of the Aorta, being

† See Hiſt. of the Royal Academy of Sciences, An. 1734, p. 44.

ſtrong adherent to the adjacent portions of the Peritoneum, and form in conjunction with the filaments furniſhed by each poſterior Intercoſtal, a third Plexus, call'd the Hypogaſtric Plexus, which is divided oppoſite to the laſt vertebra of the loins into two flat Ganglions, from which a great many filaments ariſe, which are diſtributed to all the parts included in the Hypogaſtric Cavity; namely, the Inteſtinum Rectum, the Veſiculæ Seminales, the Proſtatæ, the Bladder and the Uterus.

The intercoſtal Nerve, after having furniſhed in the Breaſt the five branches which compoſe the *anterior intercoſtal Cord*, becomes ſmaller. Being arrived at the eleventh vertebra of the back, it approaches to this anterior cord, and after having paſſed thro' the poſterior and lateral part of the Diaphragm, it advances a little forwards upon the bodies of the Vertebræ. Immediately after it becomes larger, by filaments of communication from the two laſt dorſal pairs, and continues its road, ſlipping between the Pſoas Muſcle and the adjacent tendons of the ſmall Muſcle of the Diaphragm, upon the lateral parts of the bodies of the Vertebræ, of the Loins, and of the anterior ſurface of the *Os Sacrum*, advancing to its inferior part, where it terminates in communicating by a tranſverſe cord with the oppoſite intercoſtal.

The *ninth Pair* riſes between the Corpora Pyramidalia and Olivaria. It comes out of the Cranium, thro' the Occipital holes, call'd the anterior Condyloidean holes; and after its coming out it paſſes before the firſt Ganglion of the Intercoſtal, and in deſcending it approaches the angle of the inferior jaw, where it forms a flexure. In this courſe it communicates with the firſt and ſecond vertebral Pairs, and furniſhes a branch to the Larynx, and another more conſiderable which paſſes behind the Maſtoidean Muſcle, to loſe itſelf in the Sterno Hyoidean and the Bronchial Muſcle. The

The cord of the ninth Pair afterwards reaches the tongue, adhering firſt to its root and continues almoſt to its point, running out in branches every way, and communicating with the portion of the inferior maxillary branch, which, I have ſaid, is alſo diſtributed to the tongue.

The *tenth Pair* riſes anteriorly from the *Medulla Oblongata*, oppoſite to the great occipital hole, by a ſingle plan of ſmall filaments which re-unite to paſs altogether thro' a hole of the *Dura Mater* almoſt oppoſite to their origin; and having paſſed thro' this membrane they ſlip into a groove, form'd behind the ſuperior oblique Apophyſis of the firſt Vertebra, and form a Ganglion, from which thoſe filaments riſe, which are diſtributed to the *Muſculi Obliqui* and *Recti* of the Head.

The *Nervi Acceſſorii*, or the companions of the eighth Pair, riſe from each ſide of the Medulla Spinalis, generally in the part which correſponds to the diſtance between the fourth and fifth Vertebræ of the Neck, by a ſmall filament which enlarges in aſcending thro' thoſe which the three firſt vertebral pairs furniſh it with. Theſe Nerves being thus enlarg'd enter into the Cranium thro' the great occipital hole, and reach the holes thro' which the eighth Pair comes out of the Cranium, to accompany it; and immediately after their coming out, theſe Nerves quit the eighth Pair, pierce the Maſtoidean Muſcles, to which they furniſh ſome filaments, and paſſing from before backwards, over the *Elevator Omoplatæ*, they communicate with a branch of the ſecond vertebral Pair, and afterwards loſe themſelves in the *Muſculus Trapezius*.

Tho' the Nerves of the ſpinal marrow all come thro' the lateral holes of the vertebral duct, and thro' the anterior holes of the *Os Sacrum*; yet this marrow, as I have already ſaid, does not extend all along this duct; for it generally terminates about

the firſt or ſecond vertebra of the loins, in a blunt point, from the circumference of which ariſe ſeveral nervous filaments which form what the Antients call'd the Horſes tail, which afterwards produces the Nervi lumbares and Sacri.

The Nerves which come from the ſpinal marrow riſe in pairs, as well as thoſe ſent from the Medulla Oblongata, with this difference only, that the Nerves of the Medulla Oblongata riſe by ſeveral filaments which reunite near their origin to form a nervous cord; and that thoſe of the ſpinal marrow derive their origin by two plans or rows of fibres, one of which comes from the anterior part of the marrow, and the other comes from its poſterior part. Theſe two plans approach each other a little beyond the edge or ſide of the marrow, and come out of the duct in entering into as many membranous Sheaths as there are Nerves coming from the ſpinal Marrow. Theſe Sheaths are furniſh'd by the Dura Mater, and they are pierced at the beginning, with two ſmall holes very near each other, for the paſſage of the two plans which have compoſed each of the Nerves which riſe from the ſpinal Marrow; and theſe two plans unite immediately after, forming a kind of Node, call'd a Ganglion, which afterwards produces the trunk of each Nerve.

The Nerves of the Spinal Marrow, called the *Vertebral Nerves*, are diſtinguiſhed by pairs, which have received various names drawn from the Vertebræ to which they correſpond, for which reaſon they are called *Cervicales*, *Dorſales*, *Lumbares*, and *Sacri*. There are ſeven *Cervical* pairs, twelve *Dorſal*, five *Lumbar*, and generally ſix *Sacred*. The firſt *Cervical* pair, after ſending ſome branches, by which it communicates with the Intercoſtal Nerve, to the tenth pair, and to the ſecond Cervical, furniſhes a pretty conſiderable one, which is diſtributed to the poſterior part of the Head,

paſſing

paſſing thro' the extenſor muſcles and the Trapezius.

The ſecond Cervical Pair furniſhes three principal branches, which are diſtributed particularly to the ſkin which covers the anterior part of the neck, the back part of the head, and the external ear. It alſo ſends filaments to the extenſor muſcles of the head, to thoſe of the neck, and at laſt communicates with the firſt and the third Cervical Pair, and even with the ninth pair of the *Medulla Oblongata.*

The third Cervical Pair, after having communicated with the ſecond and fourth, is diſtributed by a great number of filaments, not only to the jugular glands, but alſo to the ſkin which covers the lateral and inferior part of the neck, the Clavicle, and the upper part of the arm. It alſo furniſhes branches to the *Trapezij* and *Supra-Spinales Muſculi*, and communicates with the Nervus Acceſſorius of the eighth pair. The third pair alſo ſends from its anterior part a branch, for the formation of the *Diaphragmatic Nerve.*

The *Diaphragmatic Nerve* is a pretty ſlender cord, formed by the concurrence of three branches furniſhed by the ſecond, third, and fourth Cervical Pairs. It enter into the breaſt, paſſing behind the Clavicle and before the Subclavian Artery, and at its entrance it receives a filament from the firſt Dorſal Pair, and communicates with the Intercoſtal Nerves. It afterwards paſſes along the lateral part of the Pericardium, to which it is ſtrongly adherent, and in its inferior part it runs a little backwards, to be diſtributed to the ſuperior muſcle of the Diaphragm. The Diaphragmatic Nerve of the left ſide is a little longer, and ſomewhat farther backwards than that of the right ſide.

The four laſt *Cervical Pairs* paſs between the portions of the *Muſculi Scaleni*, and are in general larger than the three firſt. They unite with each other by their trunks running under the arm-pits, where with the branch of communication of the third Cervical Pair, and the trunk of the firſt Dorſal, they form a kind of *Plexus*, which produces five conſiderable cords, like ſo many particular trunks, which are diſtributed to the arm, and are generally called Brachial Nerves. But beſides theſe cords, theſe different pairs furniſh ſome branches to the adjacent parts. In a word, the fourth pair ſends branches to the *Muſculus Scalenus*, to the *Elevator Omoplatæ*, and to the *Trapezius*; a pretty conſiderable branch paſſes thro' the groove of the ſuperior ſide of the Omoplata, to be diſtributed to the muſcles called *Supra-Spinalis*, *Sub-Spinalis*, and *Rotundus Minor*.

The fifth pair ſends anteriorly a branch which unites with one of the ſixth, and is diſtributed to the *Muſculus Scalenus*, the *Pectoralis Major*, and the adjacent integuments. Another branch which alſo communicates with the ſixth, ſlips under the Major and Minor Pectoralis, and is diſtributed to the Serratus Major and the Sub-ſcapularis. It loſes itſelf in the Dorſalis Major, and the adjacent Teguments.

The ſixth and ſeventh pairs having furniſhed, as I have obſerved, branches for the formation of the Brachial Nerves, alſo ſend ſeveral filaments to the adjacent parts.

The five Brachial Nerves come, as I have before obſerved, from the union of the four laſt Cervical Pairs with the firſt Dorſal pair. In 1697 the celebrated Mr. *Duverny* gave particular names to theſe Nerves: he called the two leaſt conſiderable cords the *Internal Cutaneous Nerve*, and the *Muſculo Cutaneous Nerve*. He calls the other three the

Cubital

Cubital Nerve, the *Radial Nerve*, and the *Median Nerve*.

The firſt cord, called the *Internal Cutaneous Nerve*, deſcends along the internal part of the arm, advances to the fore arm, and even continues to the hand, being principally diſtributed in all this paſſage to the ſkin which covers theſe parts.

The ſecond, called the *Muſculo-Cutaneous Nerve*, or the external Cutaneous Nerve, reaches the *Muſculus Coraco-brachialis* thro' which it paſſes, and ſlipping afterwards between the Muſculus Biceps and the Brachialis Internus, to which it is diſtributed, deſcends along the arm, and arriving at the flexure of the elbow, it paſſes to the external ſide of the Biceps and under the Median Vein, and at laſt terminates in the ſkin which covers the internal part of the fore arm.

The third cord, called the *Cubital Nerve*, paſſes along the internal part of the arm, and afterwards enters the internal Condyle of the Olecranium, deſcends along the fore arm, being concealed by the *Muſculus Cubitalis Internus*; and when it arrives at its inferior part it is divided into two branches, the moſt conſiderable of which enters the hand, paſſing over the internal common annular ligament, and is diſtributed along the lateral internal parts of the ring-finger and the little finger, ſending branches to the Hypothenar Muſcle. The ſecond or ſmalleſt branch reaches the external part of the hand, to be diſtributed to the external part of the ſame fingers.

The fourth cord, called the *Radial Nerve*, runs from the internal to the external part of the arm, paſſing between the Humerus and the muſcles of the fore arm called the *Longus*, the *Extenſor Brevis*, and the *Brachialis Externus*, reaches the ſuperior part of the Radius, lying between the *Supinator Longus*

Longus and *Brevis*, to which it is diſtributed, and in this part divides itſelf into two branches, the moſt conſiderable of which furniſhes branches to almoſt all the extenſor muſcles of the wriſt and fingers, and the ſmalleſt runs along the *Radius*, and loſes itſelf in the external parts of the four firſt fingers.

The fifth cord, called the Median Nerve, accompanies the Brachial Artery along the arm, paſſes with it under the Aponeuroſis of the Biceps Muſcle, deſcends along the fore arm between the *Sublimis* and *Profundus* Muſcles, to which it is diſtributed, and arriving at the wriſt it paſſes under the internal common annular ligament, and is divided into eight branches, one of which goes to the Thenar Muſcle. The others terminate at the thumb, the fore and middle fingers, diſtributing itſelf along the lateral internal parts of theſe fingers. It alſo furniſhes a branch to the lateral, internal, and anterior part of the ring-finger.

Mr. *Winſlow* mentions a ſixth Brachial Cord, to which he gives the name of *Axillary*, or *Articular Nerve*, on account of its contiguity to the arm-pit and the ſuperior articulation of the Humerus; but as this cord riſes moſt frequently from the ſuperior part of the Radial Nerve, we only conſider it with Mr. *Duverny* as a large branch of that Nerve which reaches the top of the Humerus, running from before backwards and outwards round the neck of that bone, to terminate conjointly with the Humeral Artery in the Deltoide Muſcle.

The *Dorſal Pairs*, which are twelve in number, are called *Dorſal* or *Coſtal Nerves*. Theſe nerves run anteriorly along the ribs, accompanying the Intercoſtal Arteries and Veins, and furniſhing in this paſſage ramifications not only to the Intercoſtal Muſcles, but alſo to thoſe which lie on the ſides. The five *Inferior Dorſal Pairs* alſo furniſh ramifications

tions to the Abdominal Muſcles. We ought to add, that each dorſal pair, at its coming out of the Vertebral Canal, furniſhes filaments to the Vertebral Muſcles; and laſtly, that the firſt Dorſal loſes itſelf almoſt entirely in the formation of the *Brachial Nerves*.

The Lumbal Pairs, which are five in number, have this in common, that they ſend backwards filaments for the Vertebral Muſcles, that they communicate with each other, as alſo with the Intercoſtal Nerve and with the Cervical and Dorſal Pairs.

The firſt *Lumbal Pair* is divided into three principal branches, one poſterior and two anterior. The poſterior pierces the *Muſculus Quadratus Lumborum*, is diſtributed to the Abdominal muſcles and even advances to the ſkin which covers the hip. Of the anterior branches there is one external, which pierces the ſuperior extremity of the *Pſoas* Muſcle and the *Quadratus Lumborum*, and runs along the creſt of the *Os Ileum*, advancing to its anterior and ſuperior ſpine, and ſends branches to the Abdominal Muſcles, to the *Faſcia-lata*, to the Inguinal Glands, and to the adjacent Teguments. The anterior and internal branch having pierced the *Pſoas* Muſcle, advances over the *Iliac* Muſcle, where uniting with a ramification of the anterior branch of the ſecond pair, it forms by this union a particular nerve, which reaches the Ligamentum Fallopij, and ſlipping along the Aponeuroſis of the Obliquus Internus, comes thro' the ring of that muſcle, to be diſtributed in man to the Teſticles, and in women to the Ligamenta Rotunda. This Nerve alſo furniſhes branches to the external parts of generation.

The ſecond *Lumbal Pair* ſends ſmall branches to the adjacent parts of the Pſoas Muſcle, and a large branch behind, which after having pierced the Muſculus

culus quadratus, is diſtributed to the lumbal and vertebral Muſcles. After this it forms a ſmall branch, which unites with the anterior and internal branch of the firſt pair, and by their union that particular Nerve is form'd, which I have ſaid is diſtributed to the external parts of generation. The ſecond lumbal pair terminates in contributing, as well as the firſt, third and fourth lumbal pairs, to the formation of the *crural Nerve*. It is alſo united to a branch of the third, and another of the fourth pair, for the formation of the *Obturator Nerve*.

The third and fourth *Lumbal Pairs* concur, as I have ſaid, to the formation of the *Obturator Nerve*, but they loſe themſelves almoſt entirely at the formation of the crural Nerve.

The *Obturator* Nerve, form'd by the ſecond, third, and fourth lumbal Pairs, runs all along the lateral internal part of the *Pſoas* Muſcle, deſcends into the Pelvis, and reaches the ſuperior part of the Foramen Ovale, thro' which it paſſes, and in its courſe is diſtributed to the *Obturator*, *Pectinæus*, and *Triceps* Muſcles.

The fifth *Lumbal Pair*, after communicating with the obturator Nerve, joins the four firſt of the *Paria Sacra* to form on each ſide but one cord, which is the moſt conſiderable Nerve of the body, call'd the *Iſchiadic Nerve*. It alſo receives a branch from the fourth lumbal Pair.

As for the *Paria Sacra* they are moſt commonly ſix in number. The four firſt, which are the moſt conſiderable, loſe themſelves almoſt intirely in the formation of the *Iſchiadic* Nerve. 'Tis however to be obſerv'd, that the ſecond and third Pairs ſend off ſeveral ramifications which are diſtributed to the parts included in the Pelvis; namely, in Man to the Bladder, Rectum, Veſiculæ Seminales, Proſtratæ and Penis; and in Women to the Uterus, Fallopian Tubes and Clitoris. The

The fourth Pair alſo furniſhes filaments to the edge of the Anus, to the Perineum, to the Scrotum, and to the Muſculi Erectores. The fifth Pair goes to the muſcles of the Anus, and the ſixth to the Coccyx and to the ſkin which covers it.

The principal branches of the *Paria Sacra* come thro' the anterior holes of the *Os Sacrum*, the poſterior only affording a paſſage to ſome ſmall branches which loſe themſelves in the adjacent parts.

The *crural Nerve* is form'd principally by three branches, which are furniſh'd by the ſecond, third, and fourth lumbal pairs. It deſcends along the internal ſurface of the Os Ileum, being partly cover'd with the Pſoas, and paſſes under the arch of the abdominal Muſcles to reach the ſuperior and anterior part of the thigh, where it furniſhes ſeveral branches which ſend ramifications to the inguinal Glands and adjacent Muſcles, eſpecially to the *Triceps*, Pectinæus, Sartorius, and extenſores Tibiæ. A pretty conſiderable branch deſcends with the Sartorius to the internal Condyle of the Femur, furniſhing filaments to the ſkin, and continues its road along the lateral internal part of the leg, accompanying the Vena Saphina, and advances above the foot where it terminates.

The *Iſchiadic Nerve* is form'd, as I have before obſerv'd, by the laſt lumbal Pair, by a branch of the fourth, and the four firſt Paria Sacra. This Nerve comes out of the Pelvis thro' the iſchiadic groove, paſſes under the pyriform Muſcle, and ſends branches to it as well as to the *Glutei* Muſcles. A conſiderable branch of theſe, which go to theſe Muſcles, furniſhes ramifications which are diſtributed to the ſkin of the poſterior part of the thigh, to the *Sphincter Ani*, and to its *Elevatores*. The iſchiadic Nerve, after having furniſh'd theſe branches, paſſes between the tuberoſity of the iſchium and

the great trochanter, deſcends along the poſterior part of the thigh, ſlipping between the flexor muſcles of the leg, to which it furniſhes branches; and arriving a little above the ham it is divided into two principal branches, the moſt conſiderable of which may be call'd *Tibial*, becauſe it deſcends along the Tibia to reach the ſole of the foot, and the other fibularis, becauſe it reaches the ſuperior part of the Fibula, after having ſent two ramifications to the knee, which become cutaneous; and there it is divided into two principal branches, one of which, after having paſſed thro' the *Muſculus longus Fibularis* almoſt in its middle part, runs obliquely forward, to deſcend along the inferior part of the leg, not being cover'd with any muſcle, and is continued along the foot, being divided into ſeveral filaments, ſome of which advance to the toes, and others loſe themſelves in the ſkin. The ſecond branch paſſes thro' the longus extenſor of the toes, in its ſuperior part, reaches the *Arteria Tibialis Anterior*, and deſcending with this Artery, along the interoſſeous ligament, paſſes with it under the external common annular ligament; and after having ſent a filament or two to the extenſor brevis, terminates in diſtributing itſelf along the lateral external part of the toes, from the firſt to the fourth. The fibular branch alſo furniſhes two ramifications, which loſe themſelves near the ſuperior part of the leg, being diſtributed to the Muſculus Tibialis anterior, and the extenſor longus of the toes.

The *Tibial Branch* furniſhes immediately above the ham, a ramification which advances between the two heads of the Gemini, deſcends along the poſterior part of the leg, being only cover'd with the ſkin to which it is diſtributed, paſſes afterwards behind the malleolus externus and advances over the foot, where it is diſtributed to the teguments and adjacent muſcles, and terminates at laſt by a ſmall filament

filament along the fourth and fifth toes. The *Tibial Branch*, after having furniſhed this ramification, deſcends behind the Muſculus Popliteus, between the Muſculi Gemini, to which it furniſhes filaments, afterwards pierces the ſuperior part of the *Muſculus Solaris*, ſlips downward between this muſcle, and the flexor longus communis digitorum continues to the malleolus internus, behind which it paſſes under a particular ligament and reaches the great groove of the Calcaneum. In all this paſſage this branch furniſhes filaments, not only to the adjacent muſcles, but alſo to the ſkin which covers them; and in paſſing into the groove of the Calcaneum it is divided into two cords, call'd *Plantares*, which run to the ſole of the foot, ſlipping between the flexors of the toes. The moſt conſiderable cord, call'd *Plantaris internus*, furniſhes branches to the thenar and internal lateral part of the toes, from the firſt to the fourth; and the ſecond cord, call'd *Plantaris externus*, is diſtributed to the lateral external part of the fourth toe, and to the fifth, as well as to the parathenars and interoſſeous Muſcles.

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SECTION V.

Of ADENOLOGY.

ARTICLE I.

Of the Glands in General.

ADENOLOGY is that part of Anatomy which treats of the Glands. According to Anatomiſts, the Glands are certain organs capable of ſeparating from the blood any particular humour, or only of perfecting that which we call *Lymph.* For this reaſon we diſtinguiſh two ſorts of Glands, one call'd *Conglomerate*, and the other *Conglobate* or *Lymphatic*. As it is neceſſary, before we proceed to a particular deſcription of the Glands, to have ſome idea of the Glands in general, and of the ſecretions perform'd by their means; the reader may conſult what is ſaid on that ſubject in the chapter concerning the liver.

If we call to mind what has been ſaid of the organs included in the three principal cavities of the body, it muſt be readily granted, that the number of *Conglomerate* and *Conglobate* Glands is very conſiderable, and to give a more diſtinct idea of them, I ſhall make a diſtinct enumeration of them, beginning with thoſe of the conglomerate kind obſervable in the Face and internal part of the Cranium.

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ARTICLE II.

Of the Glands in particular.

THE firſt, and at the ſame time the moſt conſiderable of all the Glands in the human body, is that which is included in the internal part of the Cranium, and which, as I have before ſaid, comprehends the *Brain*, the *Cerebellum*, and the *Medulla Oblongata*. In this number we ought alſo to claſs the Glands of the *Plexus Choroides* and that call'd the *pituitary Gland*.

As for the Glands of the face, beſides thoſe which *Steno* has diſcover'd in the whole extent of the ſkin, and which he has call'd the *miliary Glands*, and thoſe which *Valſalva* has alſo found, and which he has call'd *ſebacious Glands*, we ought to take notice of the *lachrymal Gland*, to thoſe which in part compoſe the *Caruncula Lachrymalis*, and thoſe which are placed under the edges of the eye-lids, and which are call'd *Ciliary*.

In the noſe we conſider no other Glands than thoſe interſperſed upon the membrane which covers it internally, commonly call'd the *Membrana Pituitaria*.

The Glands, whoſe excretory ducts communicate in the mouth, are very numerous; for, beſides the *Parotids* and *Maxillaries*, we alſo obſerve the *Sublinguals*, the *Labials*, the *Buccals*, the *Palatines*, the *Amygdalæ*, and the orifices of the glandular Granulations, which are interſperſed as well on the ſurface of the Uvula, as on that of the *Pharynx*.

As for the ear, we only find in it the *Glandulæ Cæruminoſæ*, which furniſh the wax collected in the external duct, and ſome *ſebacious* Glands; to which we ought however to add the glandulous granulations, which are interſperſed on the membrane

which lines the caſe of the *Tympanum* and the *Euſtachian Tube.*

The breaſt is the cavity of the body, where there are the feweſt Conglomerate Glands. Among the number of theſe Glands ſome Anatomiſts place the *Thymus.* 'Tis alſo probable, there are ſome Glands in the thickneſs of the *Pleura* and *Pericardium*, which furniſh the liquor moſt commonly collected in the cavity of that bag. We ought not to forget the *Bronchials*, which furniſh a lymphatic humour in the cavity of the *Bronchia* and the *Tracheals* in the *Trachea Arteria*, to which we ought to add thoſe of the internal part of the Larynx, on account of the connexion they have with the lungs, I mean the *Arytenoideans*, and that ſituated on the convex part of the *Epiglottis*, to which ſome add the *Thyroide Gland. Vercelloni*, an Italian Anatomiſt, pretends that this Gland is a Nidus for worms, which paſs into the Œſophagus by ducts, which, he ſays, communicate with the cavity of the mouth, and afterwards reach the ſtomach to facilitate the digeſtion of the aliments. Moſt Anatomiſts doubt of the exiſtence of theſe pretended ducts, and look upon this Gland as conglobate.

The lower belly is the cavity of the body where the Conglomerate Glands are moſt numerous, for beſides thoſe which ſeveral Anatomiſts admit in the thickneſs of the Peritonæum, we alſo find in it the *Pancreas*, the *Liver*, the *Kidneys*, the *Glands* of the Stomach, thoſe of the Inteſtines which have been diſcover'd by *Peyerus* and *Bruun*, the *Capſulæ Atrabiliares*, which are alſo by many claſſed among the Conglomerate Glands, the *Proſtatæ* both ſuperior and inferior, and the Glands of the ſpongeous texture of the *Urethra*; to which we ought to add thoſe which in the cavity of the Bladder and Ureters furniſh a humour capable of defending their ſides againſt the too ſtrong impreſſions of the urine;

and

and laſtly, thoſe of the internal ſurface of the Prepuce and of the *Corona Glandis*.

There are alſo ſome Glands which enter the compoſition of the organs in women deſtin'd for generation; ſuch are thoſe which ſome anatomiſts admit in the internal ſurface of the Uterus, thoſe of the Vagina, thoſe placed under the *Plexus Retiformis*, the glandulous body which embraces the Urethra, and laſtly, the *Sebacious* Glands obſervable in the internal ſurface of the external Labia.

To all theſe Glands we ought to add thoſe which *Clopton Havers* has called Mucilaginous, and which in the articulations furniſh the liquor which maintains the flexibility of the Cartilages, and which is called *Synovia*.

We obſerve no Conglobate Gland in the internal part of the Cranium, unleſs we give that name to thoſe glandulous granulations ſometimes obſerv'd along the ſuperior longitudinal *Sinus*, and which *Pacchioni* looks upon as true Glands.

There is a Conglobate Gland which touches on the *Parotid*, and another on the baſe of the inferior jaw, for which reaſon ſome Anatomiſts have diſtinguiſhed the *Parotid* and *Maxillary* Glands into *Conglobate* and *Conglomerate*. There are alſo *Conglobate* Glands which accompany the internal *Jugular* Veins, called *Jugular Glands*, and others placed in the poſterior part of the neck, for the moſt part near the *Occipital*, and theſe are called *Occipital Glands*. Others are farther diſtant from the Occipital, and theſe are call'd *Cervical*.

In the breaſt we generally conſider no other Conglobate Glands but thoſe called *Œſophagian*, or *Dorſal*. They are generally two in number, fixed to the *Œſophagus* oppoſite to the fifth Vertebra of the back. *Vercelloni* is of the ſame opinion concerning theſe Glands, as concerning the *Thyroidean*, that

is to ſay, that they are receptacles for the worms which paſs into the cavity of the *Œſophagus* to facilitate the digeſtion of the aliments.

The * Œſophagean Glands have been obſerved to become *ſcirrhous*, and inflated to ſuch a degree, that by their hardneſs and inflation they have ſo compreſſed the ſides of the Œſophagus that this cavity has been effaced, which has proved mortal to the patient, by preventing the paſſage of the aliments into the ſtomach. We alſo take for Conglobate Glands ſome glandular granulations found at the baſis of the Heart; ſeveral moderns alſo place the Thymus in the ſame claſs.

In the lower belly we find ſeveral Conglobate Glands, namely, the *Gaſtrics*, which touch the ſuperior orifice of the ſtomach; the *Hepatics*, obſervable in the concave part of the liver, near the entrance of the *Vena Portæ*; and others adjacent to the neck of the gall bladder, which are called *Cyſtics*. There are alſo ſome which touch the internal ſurface of the ſpleen, and are called *Splenic*, and others at the ſuperior part of the Epiploon, which are called *Epiploic*. Laſtly, there are the *Lumbal Glands*, which are ſituated near the *Receptaculum Chyli*; the *Meſenteric*, which are diſperſed in all the extent of the Meſentery; the *Iliacs*, which touch the veſſels of that name; and the *Glandulæ Sacræ*, placed on the internal ſurface of the *Os Sacrum*.

We alſo diſcover Conglobate Glands in the extremities of the body: the firſt are the *Axillaries*,

* The Gulæ Paralyſis is an inability of ſwallowing; it proceeds from theſe glands being enlarged from the ſize of a kidney bean to a hen's egg, which preſſing one ſide of the Oeſophagus to touch the other, prevents any thing from paſſing downwards. Many within theſe few years have died of this diſeaſe, being ſtarved to death; and as it is a caſe beyond the reach of internal medicine, it is only to be remedied by forcing a paſſage with the probang. I have ſaved a lady by this method.

which

which are generally three in number, and are only covered with the common Tegument. We ſometimes alſo find glandular granulations at the flexure of the elbow, adjoining to the tendon of the *Muſculus Biceps*, and theſe glandular granulations are ſo many Conglobate Glands.

In the groin we alſo find ſome Conglobate Glands, which are covered with no muſcles; theſe are eight or ten in number, and divided into two rows, about an inch diſtant from each other. We alſo find two or three Conglobate Glands about the middle of the thigh, which are called *Crural*, and are only covered with the *Muſculus Sartorius*. There are alſo ſome Conglobate Glands found at the ham.

Of the Lymphatic Veſſels.

Beſides the arterial and venous Lymphatic Veſſels which I have mentioned in the beginning of this treatiſe, and which I have ſaid are found on the white parts of the body, as the ſkin, the *Tunica Conjunctiva* of the Eye, *&c.* there is another ſpecies called *Valvular Lymphatics*, on account of the great number of Valves which are found in them, and which are diſcovered without theſe veſſels by ſo many ſmall nodes, by which they ſeem as it were to be interſected. Theſe veſſels are obſervable on the ſurface of the Viſcera, and principally on that of the Liver, where they form a beautiful piece of network. They are eaſily diſcovered on its ſuſpenſory ligament. They alſo accompany moſt of the veins, as well as all the Conglobate Glands, in which theſe veſſels ſeem to terminate; but we ſee them come out of theſe Glands by other branches, which are generally more conſiderable than thoſe which have enter'd into it, and which terminate in the other adjacent Conglobate Glands.

Theſe veſſels are tranſparent, and only appear compoſed of a pretty ſlender membrane. Their

tranſparency permits us to diſcover the clear and gentle mucilaginous liquor with which they are filled, and which is called *Lymph*. They diſcharge this liquor into the *Receptaculum Chyli*, the *Thoracic Duct*, and the principal trunks of ſome of the veins which they accompany. The Lymph is reſorb'd by theſe veſſels in all the parts, and we ought to look upon it as the Reſiduum of that which has not been employed for their nouriſhment. In mixing with the Chyle it ſerves to dilute it, and furniſh it with the nutritive parts which it contains.

We are not ſufficiently acquainted with the firſt ſources of theſe veſſels, nor with their diſtribution in the human body, to give an exact deſcription of them. We may in general look upon them as ſo many veins, which carry back from the circumference to the center of the body the liquor which they contain; and this end is promoted by the great number of Valves with which they are fortified.

The diſcovery of the Arterial and Venous Lymphatics is due to the modern Anatomy, whereas the *Valvular Lymphatics* have been known ſince the year 1651, and the diſcovery of them has been commonly aſcribed to *Thomas Bartholin* and to *Rudbeck*.

F I N I S.

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